THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

VOL. II.—No. 35. NEW-YORK, SATURDAY, JUNE 1, 1861. $3 PER ANNUM.

CORNELIUS & BAKER,
MANUFACTURERS OF
LAMPS, CHANDELIERS, GAS-FIXTURES, &c.,
MANUFACTORIES
821 Cherry St., and Fifth St. and Columbia Avenue.
STORE, 710 CHESTNUT STREET,
PHILADELPHIA.

MITCHELL, VANCE & CO.,
MANUFACTURERS OF
CHANDELIERS,
AND EVERY DESCRIPTION OF GAS-FIXTURES.
WAREHOUSE, No. 620 BROADWAY.
Manufactory, 335, 337, 339, 343 West 24th Street,
NEW YORK.

GAS-FIXTURES.
BALL, BLACK & CO.,
565 and 567 Broadway,
CORNER OF PRINCE STREET, NEW YORK,
In addition to their large stock of
RICH GOODS,
Offer for sale a large assortment of
CHANDELIERS AND GAS-FIXTURES
Of every description and of the newest styles,
Both
FOREIGN AND DOMESTIC
Manufacture.

FELLOWS, HOFFMAN & CO.,
(LATE STARR, FELLOWS & CO.,)
MANUFACTURERS OF
Gas-Fixtures and Chandeliers,
Solar, Camphene & Fluid Lamps, Girandoles, Hall-Lanterns, &c.
No. 74 BEEKMAN STREET, NEW YORK.
MANUFACTORY, 71, 73, 75, 77, 79, 81, 83 Boerum Street.
And 88, 90, 92, 94, 96, 98, and 100 Johnston St., BROOKLYN, N. Y.

E. V. HAUGHWOUT & CO.,
488, 490, & 492 Broadway,
Corner of Broome St., New York,
Gas-Fitters and Contractors for the Erection of Gas-Works.
Messrs. E. V. HAUGHWOUT & Co. have on hand a most extensive assortment of the newest and most desirable styles of
CHANDELIERS, BRACKETS, LAMP-POSTS, AND GAS-FIXTURES OF EVERY DESCRIPTION,
to which they would respectfully call the attention of the public.
☞ Gas-fitting done in the most workmanlike manner, and on reasonable terms.

C. A. VAN KIRK & CO.,
MANUFACTURERS OF
Gas-Fixtures and Chandeliers,
Ambrose's Patent Coal-Oil Burners, to be used without Chimnies, Patent Paragon Coal-Oil Burners, Patent Improved Excelsior Coal-Oil Burners, Hand Lamps, Columns, &c.
MANUFACTORY AT FRANKFORT, PHILADELPHIA.
SALES-ROOM, 625 CHESTNUT STREET.
☞ Every article warranted equal in design and workmanship to any manufactured in the country.

M. L. CURTIS,
141 ELM STREET, NEW YORK CITY,
MANUFACTURER OF
GAS-FIXTURES.
GAS-FITTING IN ALL ITS BRANCHES.
OLD CHANDELIERS, &c., RE-FINISHED IN GILT, OR BRONZED,
OR MADE TO APPEAR EQUAL TO NEW.

ANALYTICAL CHEMISTS.

CELTON BUCK, ANALYTICAL and Consulting Chemist, 39 Nassau st., New York. Analyses of Ores, Minerals, Soils, Guanos, Coals, &c., and Tests of Commercial Articles, carefully and promptly made. Consultations may be had, and opinions given on Chemical questions. Samples for analysis from a distance, may be sent by mail or express, directed to the Laboratory as above.

LABORATORY OF CHEMISTRY.—Consultations on Chemistry applied to arts and manufactures, agriculture, metallurgy, analysis of ores, mineral waters, soils, &c. Advices on chemical fabrications. Address, Professor H. DUSSAUCE, Chemist, (from the Conservatoire Imperial of Arts and Manufactures, Paris) New Lebanon, N. Y.

ANALYTICAL & MANUFACTURing Chemistry—Gesner's Chemical and Engineering Rooms, 24 William street, New York. Rooms No. 28 and 29. Amlysis made of all mineral and commercial articles. Coal oils tested, coal oil works erected, and contracts made. The best processes for purifying and deoderizing; coal and petroleum oils furnished, with skilful workmen and superintendents. Mines surveyed and coals tested.

The Kerosene patents, from which the coal oil business in the United States originated, were granted to Dr. Gesner, Chemist and Geologist.

MISCELLANEOUS.

WOODEN TRAYS FOR GAS-PURIFIERS.—JOHN L. CHEESMAN, No. 147 Avenue C, near Tenth street, New York, manufactures his Patent WOODEN TRAYS for GAS-PURIFIERS, *cut out of the solid wood*, superior to the ordinary iron plates, cheaper and more durable. The attention of Gas Companies and Engineers is called to this improvement, which has been adopted by the following Gas-Works:

Albany, N. Y.	Manhattan, N. Y. City.
Chicago, Ill.,	Philadelphia, Penn.,
Williamsburgh, N.Y.,	Worcester, Mass.

See engravings on page 148, vol. II.

HARRIS LOUDERBACK,
FIRE-BRICK LAYER
AND GAS RETORT SETTER,
No. 1005 Clement Street, Philadelphia.

WATER-GAS WORKS.

WATER-GAS.—APPLETON & GRAHAM,
AGENTS FOR THE
NEW ENGLAND WATER-GAS CO.,
UNDER THE SANDERS PATENT,
Are prepared to give estimates for Works, and guarantee the cost of Gas not to exceed One Dollar per 1000 cubic feet.
☞ Coal or Rosin Gas-Works altered at small expense.
A. & G. continue as heretofore to erect their improved Rosin and Rosin-Oil Works for Private Dwellings, Factories, &c. For further particulars apply at 56 Washington st., Boston.

WOODEN GAS-PIPE.

PATENT PREPARED WOOD-PIPE for Gas Mains.—Wm. Stephenson would call the attention of Gas Companies and Engineers to his Patent Prepared Wood Gas-Pipe. This Pipe is prepared in a way so as to effectually prevent its decay, and has been proven to be superior to Iron pipe in three towns where he has erected Gas-Works.

The cost of the Pipe, and the facility with which it can be laid, and *also its not being subject to expansion* and contraction by change of temperature, render it *entirely free from leakage;* there is also less condensation than in Iron pipe. These are among the advantages gained by the use of this Pipe, and are sufficient to recommend it to the favorable consideration of Gas Companies and Engineers; and it is considered, by those who have examined it, as a most valuable improvement.

A sample of this pipe may be seen at the rooms of the AMERICAN GAS-LIGHT JOURNAL, No. 39 Nassau street, New York; and further information, with reference to this Pipe, may be obtained by application to the Patentee,

WM. STEPHENSON, Gas Engineer,
Fremont, Ohio.

SITUATION WANTED.

A FIRST-CLASS GAS-ENGINEER, who has filled one of the first positions as such in the United States, wishes an engagement in a Gas-Works.

Full particulars will be given on addressing M. F. H., Post-office, Philadelphia.

GAS-FIXTURES.

TIFFANY & COMPANY, JEWELers and importers of elegant artistic PARIS GAS CHANDELIERS, BRACKETS, PENDANTS, &c., in Bronze and Gilt.
No. 550 BROADWAY, NEW YORK.

PHILADELPHIA GAS FIXTURE Works.—Warner, Miskey & Merrill, Manufacturers, Store, No. 718 Chestnut street, Philadelphia. Warner, Peck & Co., No. 376 Broadway, New York, would respectfully inform the public that they continue to Manufacture all kinds of Gas Fixtures, Lamps, Girandoles, Bronzes &c., and that their large and varied stock comprises the simplest as well as the most elaborate patterns, designed by their French artists. They also continue to keep at their store, 376 Broadway, a large and full assortment of all their manufactured Goods. Dealers and others are invited to call and examine.

GAS FIXTURES TO BE SOLD, at Wholesale Prices.—In consequence of alterations in his Store, the subscriber is obliged to dispose of his entire stock of GAS FIXTURES. Those wishing to purchase at very low prices will do well to call. Gas Fixtures removed. Gas fitting executed in all its branches.
J. H. VAN REED,
219 Bleecker st., N. Y.

GAS FIXTURES and FITTINGS. RINGUET-LEPRINCE & L. MARCOTTE, Warehouse, 347 Fourth street.—Manufactory, 55 West Sixteenth stree. New York.
RINGUET-LEPRINCE, 8 Rue de la Paix, Paris.
Painting, Paneling, Cabinet Work, Looking-Glass Plates, Mirror Frames, Silk, Worsted and Woolen Materials, Aubusson and Moquette Carpets, Gas Fixtures, Bronzes, &c.

GEORGE H. KITCHEN & CO., Manufacturers of Fixtures for Gas Light purposes, Wood's Building, No. 561 Broadway, New York. Office of the Inspector of Gas Meters for the State of New York.

HARPER & O'CONNELL, Manufacturers of Gas Shades and Globes of every description. FRENCH COLORED GAS SHADES AND SMOKE BELLS. Nos. 63 and 65 Elizabeth Street, corner Hester, New York.

GAS-HOLDERS.

GASOMETERS, RETORT-HOUSE ROOFS, WATER-TANKS,
PURIFYING-BOXES, COAL-CARS, COKE BARROWS,
AND ALL KINDS OF
WROUGHT-IRON WORK FOR GAS AND WATER WORKS.
Manufactured by GEORGE W. KRAFT, Chestnut street wharf, West Philadelphia, Pa.

GEORGE STACEY, CINCINNATI, O., Manufacturer of single and Telescopic Gasholders, Wrought-Iron Bridges, Girders, Joists and Stairways, Coke and Coal Wagons, Rakes, Screens, and other Gas-works tools, Slide and Cup Valves, Bolts, Nuts, Chisels, Ladles, and other tools, Wrought-Iron Roofs, for Slate and Corrugated Iron, Gas Purifiers, Washers, Centre Seal Valves and other Gas apparatus, Boiler-plate Retort Lids. Refer to—
Cincinnati Gas-Light & Coke Co.
Nashville Gas-Light Co.
Springfield Gas-Light Co.
Columbus Gas-Light Co.
Cleveland Gas-Light Co.
Covington and Newport Gas-Light Co.
Memphis Gas-Light Co.
Indianapolis Gas-Light and Coke Co.
James H. Caldwell, Esq., New Orleans.
John Jeffrey, Esq., Cincinnati.

POOLE & HUNT, BALTIMORE, MD., are prepared to execute orders for
GAS-HOLDERS,
IRON-ROOF FRAMING,
And all other descriptions of
Iron Work for Gas-Works, Water-Pipes, and Heavy Castings, and Machinery generally.

GAS-HOLDER FOR SALE.—25 feet diameter, 14 feet high, capacity about 6,800 feet. Has been in use but a short time. Good as new. Cast iron guide frame, balance weights and chains complete. Will be sold for $500 (which is less than half its cost), if applied for immediately. Address
M., Box 406 Post Office,
Philadelphia, Pa.

CLAY RETORTS.

ELLIMAN BROTHERS, 217 PEARL Street, New York, Commission Merchants, Importers of BELGIAN FIRE-CLAY GAS RETORTS, Dealers in Tiles, Arch-Bricks, Furnace-Doors, MOUTH-PIECES, COVERS, And all other Fittings, of the most approved patterns, for setting Clay Retorts.

SABBATON'S PATENT FURNACE-DOORS, & FRAMES, Floyd's Patent Malleable Iron Retort Covers, McKENZIE'S PATENT GAS EXHAUSTERS, made by Addison Smith. Compensator-Valves, &c. Gas, Water, and Steam Tubes.

PHILADELPHIA FIRE-BRICK Works, corner of Vine and Twenty-third streets, Philadelphia.
JOHN NEWKUMET,
Manufacturer of all kinds of FIRE-BRICK, GAS-HOUSE TILES, to suit all the different plans in use. Clay Retorts and Dentists' Muffles. Orders filled at short notice.

PATENT PYRO-CLAY GAS RETORTS. THOMAS HOADLEY, Patentee, wishes to call the attention of Gas-Engineers to these

RETORTS,

as a very superior article.
REFERENCES:—Gas-Light Works, Buffalo, N. Y.
" " Cleveland, O.
" " Chicago, Ill.
THOS. HOADLEY,
Corner of Main and Mulberry Sts., Cleveland, O.

NEW YORK FIRE-BRICK Manufactory. (Branch Works at Kreischerville, Staten Island.)
B. KREISCHER & CO., office 56 Goerck street, corner Delancy street, New York.
GAS-HOUSE TILES and FIRE-BRICK of all shapes and sizes. FIRE MORTAR, CLAY, and SAND articles of every description made to order at the shortest notice. B. KREISCHER, M. MAURER, A. WEBER.

KENNEDY'S METHOD OF SECURING Iron Mouth Pieces to Clay Retorts.—The Retort is made in the usual form, but without any bolt-holes through the flange. An iron collar in two pieces, is placed around the Retort behind the flange, and bolted to the mouth-piece outside of the flange instead of through it.
For engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, page 245. Address the Patentee. JOHN P. KENNEDY, Trenton, N. J.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE, ENGLAND,
Manufacturer of CLAY RETORTS, FIRE BRICKS, and every description of FIRE CLAY GOODS.

COWEN'S PATENT FIRE-CLAY Retorts.
JOSEPH COWEN & CO., Blaydon Burn, near Newcastle-on-Tyne, England, were the only parties to whom a Prize Medal was awarded at the Great Exhibition in London, of 1851, for "GAS RETORTS AND OTHER OBJECTS IN FIRE CLAY."
J. C. & Co. have been for many years the most extensive manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for FIRE-CLAY RETORTS of all shapes and dimensions, FIRE-BRICKS, and every other article in Fire-Clay, are promptly executed at their works as above.
COWEN'S GARESFIELD COAL AND COKE.
Coal and Coke Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

CLIFF'S ENGLISH CLAY
RETORTS,
Retort-Covers, Gas-Exhausters, Furnace Doors, Castings, Implements, Photometrical and Meter-Proving Apparatus.
T. W. PARMELE, Sole Agent,
No. 4 Irving Place, New York.

IRON RETORTS.

CELLULAR GAS-RETORTS.—C. M. CRESSON'S CELLULAR Gas Retorts, Patented October 3d, 1854. Adapted to the manufacture of GAS from Rosin, Coal, Wood, &c., and now in use at the Philadelphia Gas Works. Patent Rights for sale. For information apply to HENRY S. HAGERT, Attorney for Patentee, S. E. cor. of Walnut and Sixth sts., Philadelphia, Pa.

FOR SYMME'S PATENT RETORTS, MOUTHPIECES, &c., address—
ELLIMAN BROTHERS, 217 Pearl st., N. Y.
MORRIS, TASKER & CO., Philadelphia.
Or H. K. SYMMES, Newton, Mass.
See Engravings in AMERICAN GAS-LIGHT JOURNAL for July 1, 1860, page 280.

ANTI-FREEZING APPARATUS.

FREEZING OF GAS-PIPES.—Walton's Patent Anti-Freezing Apparatus illustrated by Engravings in the AMERICAN GAS-LIGHT JOURNAL, of Jan. 1, 1861, page 212, is the most simple, durable and efficient of any known process.
See also certificates from Cincinnati, O., and Louisville, Ky. Gas-Works in same number, page 208. Address, JOHN WALTON,
Sup't Gas-Works, Louisville, Ky.

IRON FOUNDRIES.

S. V. MERRICK, J. VAUGHAN MERRICK, W. H. MERRICK.

SOUTHWARK FOUNDRY, Philadelphia.
MERRICK & SONS, Engineers, Manufacturers of every description of Gas Machinery.
Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either TELESCOPIC OR SINGLE, WITH SUSPENSION FRAMES COMPLETE; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Lime Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.
Address— MERRICK & SONS,
5th and Washington Streets, Philadelphia.

BERGEN IRON WORKS, Established 1833.
R. A. BRICK, Manufacturer of CAST IRON WATER and GAS-PIPES RETORTS, PIPES, &c., always on hand. Office, 109 Leonard Street, New York.

OREGON FOUNDRY, Nos. 740, 742, 744 Greenwich Street, New York.
HERRING & FLOYD, proprietors, manufacture Gas Compensators of all sizes, Self-Acting Valves, Exhausters upon an improved plan, costing less than half those of English manufacture, also castings of every description for Gas and Water Works.
Herring & Floyd offer for sale Sabbaton's Patent Screening Shovels for coke and coals, made of malleable iron, of all sizes; Sabbaton's Patent Improved Cast Iron Furnace Frame and Door, arranged to protect the iron work of the door and frame from direct contact with the fire; also, Floyd's Patent Malleable Iron Retort Covers, only quarter of an inch thick, but of convex form, and of great strength, as is attested by certificates from several of the leading Gas-works in America. For engravings of all the above patents see AMERICAN GAS-LIGHT JOURNAL for October, 1859, pages 65 and 71.
Samples of the above castings can be seen at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

COLWELL & CO., Manufacturers, of Pig Iron and Cast Iron Gas and Water Pipes, No. 207 North Water street and 206 North Wharves, Philadelphia.
STEPHEN COLWELL, W. DWIGHT BELL,
THEO. TREWENDT, SAMUEL FULTON.

TRANER & MERCER, 117 NORTH Water Street, & 124 North Wharves, Philadelphia, AGENTS FOR THE MERCER FOUNDRY, AND ELK STREET IRON WORKS.
CAST IRON STREET MAINS; *Bends, Branches, Chemical Retorts, and all kinds of Castings for* GAS-WORKS, either COAL or ROSIN WORKS. SHEET IRON FOR GASOMETERS *cut and punched to order.* BOILER IRON *of all descriptions.* RUSSIA SHEET IRON, TIN PLATES, BLOCK TIN, COPPER, PIG LEAD, SPELTER, and Metals generally.

FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.
JOSEPH G. JONES,
205½ Walnut Street, Philadelphia.

GAS-COAL.

CLEVELAND, O., Nov. 28, 1860.
THE PARTNERSHIP heretofore existing under the name of Butts & Kendall, has expired by its own limitation with the close of the business of the present season.
F. BUTTS & CO.,
will hereafter have the control of the mines of the STERLING COAL AND MINING COMPANY,
and with such increased facilities, both as to improvements perfected at the mines and transportation of coal, as will enable them to continue the business on a more extensive scale than heretofore in *supplying Gas-Light Companies* in the different States, both East and West.
We are now prepared to contract for the delivery of the
CELEBRATED STERLING COAL
for the coming season; also, Pittsburg and other varieties of GAS-COALS.
You will therefore please to address, in relation to such contracts, F. BUTTS & CO.,
Post-Office Drawer, 74 Cleveland, Ohio.

LIVERPOOL AND NEWCASTLE CANNEL & COAL,
FOR
Gas-Manufacturers and House Use.
The careful shipment of the best qualities, of Cannel and Coal, at the lowest rates current at the time of engagement guaranteed.
T. W. PARMELE, Agt.,
No. 4 Irving Place, New York.

CANNEL & ORREL GAS-COAL.—The subscribers are constantly receiving direct, from the celebrated mines of WILLIAM H. BRANKER & CO., NEWCASTLE, ENG., COAL of the very first quality for gas purposes, which they will sell direct from ship or from yard at the lowest market price; and we guarantee the coal to be equal if not superior to any other coal brought to this market.
CORNELIUS BAKER & SON,
61 Leonard St. and 652 Hudson St., New York.

IRON FOUNDRIES.

MORRIS, TASKER & CO., PASCAL IRON WORKS,
[ESTABLISHED 1821,]
PHILADELPHIA, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues,
GALVANIZED WROUGHT IRON TUBES,
ARTESIAN WELL PIPES.
of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.
GAS AND STEAM FITTERS' TOOLS, &c.
STEPHEN MORRIS, CHAS WHEELER,
THOMAS S. TASKER, STEPHEN P. M. TASKER.

CAST IRON WATER, GAS, DRAIN AND HEATER PIPES, &c.,
COLUMBIAN IRON WORKS,
OFFICE, No. 46 NORTH SEVENTH STREET,
Below Arch Street, Philadelphia.
THOS. M. ADAMS, Proprietor.

TO GAS AND WATER COMPANIES:
The undersigned, Agent for Messrs. Thomas Edington & Sons, Phenix Foundry, Glasgow, Scotland, is prepared to contract for all descriptions of Cast-Iron Pipes of their manufacture.
About 6,000 tons of these Pipes have lately been supplied to the Brooklyn Water-works, N. Y., and the Chief Engineer of the Works, A. P. Kirkwood, Esq., is ready to testify to their excellent quality.
ARCH'LD BAXTER, 28 Beaver St., N. Y.
Sole Agent for the United States and Canada.

R. D. WOOD & CO.,
MANUFACTURERS OF
CAST-IRON PIPE, RETORTS, &c.
Office, 400 Chestnut Street,
PHILADELPHIA.

CAST IRON PIPES.—EARL'S IRON WORKS, NEWARK, N. J., 91, 93, 95, 97 and 99 Chestnut Street. Branch Office, 21 Centre street, New York.
The subscriber continues to manufacture Superior Cast-Iron Gas and Water Pipes, Branches, Bends, Angles, Bevel Hubs, Reduces, Sleeves, Drip Syphons, Plugs, Caps, Retorts, Bench Castings, and Castings in general. Particular attention paid to all Castings connected with Gas-Works. E. B. EARL.

S. S. ASHCRAFT, CINCINNATI, O., Manufacturer of Gas and Water-Pipes, with Branches of every description; Retorts for Gas and Oil Works; Gasholder Stands, Colums, &c.; Gas Purifiers, Condensers, and Gas Apparatus of all kinds; Foundry Work in general.
N. B.—A complete selection of Patterns on hand. Refer to any of the Gas-Works in the Western and Southwestern States.
THEODORE SCOWDEN, Engineer, Louisville.
JOHN JEFFREY, Civil Engineer, Cincinnati.
JACOB HOUGHTON, Engineer, Detroit.

WARREN FOUNDRY AND MACHINE CO., Phillipsburgh, N. J. Manufacturers of Cast-Iron Pipes, from 2 to 48 inch diameter, all pipes from 3 inch to 48 inch cast vertically, and in dry sand, in lengths of 12 feet. 2 inch pipes in lengths of 7 feet. Special Castings of all descriptions furnished at short notice.
REFERENCES.
Croton Aqueduct dept., N. Y.
Manhattan Gas Lt. Co., N. Y.
Brooklyn Water dept., N. Y.
Brooklyn Gas Lt. Co., N. Y.
Citizens' Gas Lt. Co., Brooklyn, N. Y.

DRAIN-PIPE.

DRAIN PIPES, ENGLISH AND AMERICAN.
Garnkirk Chimney Tops,
Plumbers' Materials,
Minton's Encaustic Tiles.
For Sale by
MILLER & COATES,
279 Pearl st., New York.

STEAM-PUMPS.

WORTHINGTON'S STEAM PUMPS, extensively used by Gas-Light Companies. For Sale at greatly Reduced Prices.
Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.
Patent GATES, for Water and Steam-stops.
HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

PHOTOMETER APPARATUS and Room for Sale.—The Room is about 6 feet wide by 12 feet long, painted black inside and screwed together. It can be taken down and boxed for transportation. All the pipes and fittings are complete for immediate use. Address PHOTOMETER, care of the AMERICAN GAS-LIGHT JOURNAL, 89 Nassau street, N. Y.

CARDS.

NATIONAL DIRECTORY
OF
Gas & Steam Fitters & Plumbers.

ALBANY, N. Y.
WILLIAM MUNSIG, 623 Broadway.
ALEX. B. SHEPARD, 17 South Pearl St.

BALTIMORE, MD.
BLAIR & CO., 366 W. Baltm'e St.
GRATTAN & EVANS, 8 North St.
J. H. McCALL & CO., 15 W. Fayette St.
JOHN RICHARDS, 274 W. Baltm'e St.

BOSTON, MASS.
J. KENNEDY, 45 Maverick Sq.
W. WILTSHIRE, 46 Devonshire St.
N. P. WOODMAN, 13 Haverhill St.
J. B. WRIGHT, 28 Devonshire St.

CINCINNATI, O.
BAKER & VON PUHL, 64 Fourth St.

NEW YORK.
JAMES HELME, 58 East 13th St.
WM TOWERS, 31 Carmine St.
GEO. C. ELLISON, 859 Broadway.
B. M. JOHNSON, 111 East 18th St.
LOCKE & CRAIGIE, 12 East 20th St.
McKENZIE & O'HARA, 326 Fourth St.
ANTHONY KENDALL, 358 W. 36th St.
DAVIS B. LANE, 167 William St.
F. B. LANGWITH, 62 White St.
FRANCIS MATTHEWS, 47 Ann Street.
CHAS. F. MERRITT, 156 Seventh Ave.
WM. PALMER, 408 Eighth Ave.
GEORGE E. PARKER, 156 Seventh Ave.
DAVID REA, 48 Cortlandt St.

GAS-ENGINEERS.

C. N. TRUMP, GAS-WORKS ENGINEER, No. 56 North Seventh street, Phila. Agent for the Aubin Gas-Works. Gas-Works erected for Towns, Villages, Factories and Dwellings.

JAMES RENWICK SMEDBERG, Consulting and Constructing GAS ENGINEER, SAVANNAH, GEO.
REFERENCES,
CHARLES ROOME, Esq., Pres. Man. Gas Co., N. Y.
J. K. BRICK, Esq., Eng'r Brooklyn Gas Co.
MESSRS. ELLIMAN BROTHERS, New York.
F. T. WILLIS, Esq., Pres. Savannah Gas Co.
J. A. SABBATON, Esq., Eng'r Man. Gas Co., N. Y.
JOHN B. MURRAY, Proprietor AM. GAS-LIGHT JOUR.

SCAMMON'S GAS-APPARATUS for Private Residences, Factories, Hotels and Cities. See engravings of Rosin and Coal Gas-Works in AMERICAN GAS-LIGHT JOURNAL for Dec. 1, 1860, pages 179 and 180.
STEPHEN SCAMMON,
GAS-ENGINEER AND CONTRACTOR.
561 Broadway, New York.

GAS-WORKS ERECTED FOR Cities and Villages. Plans and Specifications furnished for works of any desired capacity, drawings of Retort Settings for Benches of one, two, three or five Retorts.
GAS APPARATUS
of every description.
F. A. SABBATON,
Gas-Engineer and Contractor, Albany, N. Y.

WATERHOUSE & BOWES, Raleigh, N. C. Builders of Gas-Works in Southern States. The following Gas-Works have been built by them, and are their references.
Charlotte, N. C. Jacksonville, Fla.
Raleigh, N. C. Fayetteville, N. C.
Salisbury, N. C. Staunton, Va.
Yorkville, S. C. Greenville, S. C.
Waverly, Miss.

DIMMOCK, DWIGHT & CO. Engineers and Contractors for the erection of Coal Gas-Works. Offices 135 and 137 William street, New York City; and No. 2 Elm street, Springfield, Mass.
References by permission:
GEORGE D. MORGAN, Esq., New York.
AARON CLAFLIN, Esq., "
A. B. WOOD, "
GEORGE BLISS, Esq., N.Y., Pres. M.S & N.I.R.R.Co.
GEO. M. ATWATER, Esq., Springfield, Mass.
JAS. D. BREWER, Esq, Pres. Springfield Gas Co
JOHN I. BAKER, Esq, Pres. Beverly Gas Co.
HENRY E. RUSSELL, Esq., Pres. N. Britain Gas Co.
J. DUNHAM, Esq, Pres. Norwich, Ct. Gas Co.
W. C. STREET, Esq., Sec. Norwalk, Ct. Gas Co.

THE AUBIN GAS-WORKS CO., OF ALBANY, N. Y., refer to the following Gas-Light Companies using their Works, to prove that Gas stocks can pay handsomely, and yet a rich and *cheap* Gas be made, viz.: Plattsburgh, Whitehall, Palmyra, Waterford, Bath, Amsterdam, Fort Plain, N. Y.; Rutland, Vt.; Flemington, N. J.; Smyrna and Dover, Del.; Jersey Shore and Pittston, Penn.; Greensboro and Salem, N. C.; Sorel, St. Hyacinthe, and Point Levi, Canada. Agents wanted to extend the sale of the Aubin Portable Gas-Works, unsurpassed for simplicity, safety and economy.

WHERE GAS-WORKS AND WATER-WORKS ARE WANTED.

We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers, may see where are new openings for business. And as each post-master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

POST-OFFICE TOWNS IN THE UNITED STATES,

ARRANGED BY STATES AND COUNTIES,

Showing where Gas-Works and Water-Works are Wanted.

KENTUCKY.

104 Counties, 915 Towns, 5 Gas-Works, 1 Water-Works.

Adair County.

Breeding's,	*Columbia*, (c. h.,)	Millersville,
Cane Valley,	East Fork,	Milltown,
Casey Creek,	Glen's Fork,	Neatsville.
	Gradyville,	

Allen County.

Butlersville,	Gainesville,	New Roe,
Cedar Spring,	Mount Aerial,	*Scottsville*, (c. h.,)

Anderson County.

Camdenville,	Johnsonville,	Rough and Ready,
Chesher's Store,	Lawrenceburgh,	Van Buren.

Ballard County.

Adamsville,	Chestnut Hill,	Melvin,
Belle Ombre,	Elm,	Millburn,
Blandville, (c. h.,)	Hazlewood,	Sebastopol.
	Lovelaceville,	

Barren County.

Bear Wallow,	*Glasgow*, (c. h.,)	Randolph,
Black Walnut,	Horsewell,	Rockland Mills,
Blue Spring Grove,	Merry Oaks,	Rocky Hill,
Centre,	Nobob,	Roseville,
Coval Hill,	Pace's,	Sugar Plant,
Cross Plains,	Pageville,	Temple Hill,
Dry Fork,	Park,	Three Forks,
Edmonton,	Peter's Creek,	Woodland.
	Prewitt's Knob,	

Bath County.

Bethel,	Marshall,	Rockhouse,
Eastville,	Olympian Springs,	Sharpsburgh,
Gill's Mills,	*Owingsville*, (c. h.,)	Wyoming.
Laurel Fork,	Peeled Oak,	

Boone County.

Beaver Lick,	Elijah's Creek,	Northcutt's Store,
Boone,	Florence,	Petersburgh,
Bullittsville,	Hamilton,	Union,
Burlington, (c. h.,)	Hebron,	Verona,
Constance,		Walton.

Bourbon County.

Centreville,	Hutchison's,	*Paris*, (c. h.,)
Clintonville,	Jacksonville,	Ruddle's Mills,
Flat Rock,	Millersburg,	Shawhan,
Houston, (c. h.,)	Moreland,	Stony Point,
	Morth Middletown,	

Boyle County.

Danville,	Mitchellsburg,	Perryville.
	Parksville,	

Bracken County.

Augusta,	Browningsville,	Mount Olivet,
Berlin,	Foster,	Powersville,
Bridgeville,	Locust Mills,	Santa Fe.
Brookville, (c. h.,)	Milford,	

Breathitt County.

Frozen Creek,	*Jackson*, (c. h.,)	Lost Creek.
	Jett's Creek,	

Breckinridge County.

Bewleyville,	Cloverport,	Rock Lick,
Big Spring,	*Hardinsburgh*, (c. h.)	Stephensport,
Cedar Grove,	Hudsonville,	Union Star,
Clifton Mills,	Lost Run,	Webster.
	Planter's Hall,	

Bullitt County.

Belmont,	Cane Spring,	*Shepherdsville*, (c. h.)
Bitter Water,	Mount Washington,	Shortsville.
Brooks' Station,	Pitts Point,	

Butler County.

Berry's Lick,	Logansport,	Sugar Grove,
Harreldville,	*Morgantown*, (c. h.,)	Welch's Creek,
Honaker's Ferry,	Quality Valley,	Woodberry.
	Rochester,	

Caldwell County.

Burnsville,	Fredonia,	Princeton,
Farmersville,	Long Pond,	Walnut Grove.
	Pollard's Tan Yard,	

Callaway County.

Callawaytown,	Locust Grove,	Radford,
Clark's River,	Murray,	Shiloh,
Coldwater,	New Concord,	Snow Hill,
Hico,	Oakley,	*Wadesboro*, (c. h.,)
	Pine Bluff,	

Campbell County.

Alexandria, (c. h.,)	Cold Spring,	*Newport*, (c. h.,)
California,	Dale,	Grant's Lick,
Carthage,	Flagg Spring,	Tibbatt's Cross Roads.
	Indian Spring,	

Carroll County.

Carrollton,	Prestonville,	Sandefer's Store,
Ghent,		Worthville.

Carter County.

Bell's Trace,	*Grayson*, (c. h.,)	Mount Savage,
Bruin,	Knaps,	Olive Hill,
Caves,	Mount Pleasant,	Star Furnace,
Grass Land,		Upper Tygart.

Casey County.

Freedom,	Middleburgh,	Mintonville,
Liberty,		Poplar Hill.

Christian County.

Atkinson,	Garretsburgh,	Newstead,
Bainbridge,	Grissam's Chapel,	Oak Grove,
Belleview,	*Hopkinsville*, (c. h.,)	Pembroke,
Beverly,	La Fayette,	Williams,
Cottonwood,	Long View,	Woolridge's Store.
Fruit Hill,	Mills,	

Clark County.

Dunaway's,	Jones' Nursery,	Stoner,
Fryville,	Kiddville,	Walnut Valley,
Goode's Precinct,	Pine Grove,	*Winchester*, (c. h.)
	Ruckerville,	

Clay County.

Flat Creek,	*Manchester*, (c. h.,)	Sexton's Creek.

Clinton County.

Albany, (c. h.,)	Alpha,	Seventy-Six.
	Green Grove,	

Crittenden County.

Bell's Mines,	Dycusburgh,	Shady Grove,
Camp Creek,	Ford's Ferry,	Walker's,
Crittenden Springs,	Marion,	Westonburgh.

Cumberland County.

Amandaville,	*Burkesville*, (c. h.,)	Marrow Bone.

Davies County.

Crow's Pond,	Masonville,	Pleasant Point,
Curdsville,	McLean's Retreat,	Sand Spring,
Knottsville,	Mount Dallas,	Whitesville,
Long Falls Creek,	Oakford,	Yelvington.
	Owensboro', (c. h.,)	

Edmonson County.

Bee Spring,	Brownsville,	Mammoth Cave,
Big Ready,	Dripping Spring,	Sun Fish.

Estill County.

Cottage Furnace,	*Irvine*, (c. h.,)	Old Landing,
Estill Furnace,		Red River Iron Works

Fayette County.

Athens,	Cleaveland,	Walnut Hill.
	Lexington, (c. h.,)	

Fleming County.

Elizaville,	Oak Woods,	Sherburne Mills,
Flemingsburgh, (c. h.)	Pleasant Grove Mills,	Tilton,
Hillsboro',	Plummer's Mill,	Triplett,
Mount Carmel,	Poplar Plains,	White Oak Hill.

Floyd County.

Burning Spring,	Hueysville,	Lanesville,
Coal Grove,		*Prestonburgh*, (c. h.)

Franklin County.

Bald Knob,	Farmdale,	Military Institute,
Benson,	Forks of Elkhorn,	Peek's Mills,
Bridgeport,	*Frankfort*, (c. h.,)	Spring Bank.

Fulton County.

Compromise,	Lodge,	Middle Grand,
Hickman,		State Line.

Gallatin County.

Glencoe,	Napoleon,	Warsaw.
	Sugar Creek,	

Garrard County.

Back Creek,	Buck Eye,	Lowell,
Bryantsville,	*Lancaster*, (c. h.,)	Paint Lick.

Grant County.

Cordova,	Dry Ridge,	Macedonia,
Crittenden,	Gouge's,	Stateley's Run,
Downingsville,		*Williamstown*, (c. h.)

Graves County.

Cuba,	Feliciana,	Oak Ridge,
Depot,	Hickory Grove,	Symsonia,
Dublin,	Kansas,	Viola Station,
Fancy Farm,	Leander,	Wilson's Creek.
Farmington,	Mayfield,	

Grayson County.

Big Clifty,	Gaunaways,	*Litchfield*, (c. h.,)
Caneyville,	Grayson Springs,	Millerstown,
Falls of Rough,		Short Creek.

Greene County.

Allendale,	Clover Hill,	Haskinsville,
Barrick,	Felixville,	Summersville,
Catalpa Grove,	*Greensburgh*, (c. h.,)	Union Hall.

Greenup County.

Amanda,	Catlettsburgh,	Oldtown,
Ashland,	Greenup, C. H.,	Three Prong,
Callahan,	Hood's Run,	Truittsville,
Cannonsburg,	Lynn,	Tygert's Creek.

Hancock County.

Bennettsville,	Blackford,	Lewisport,
	Hawesville,	

Hardin County.

Buck Snort,	Howell's Springs,	Red Hill,
Claiborne,	Howe's Valley,	Robertsville,
Elizabethtown, (c. h.)	Otter Creek,	Stephensburgh,
Franklin Cross Roads,	Phillipsburgh,	Vine Grove,
Glendale,		West Point.

Harlan County.

Big Rock,	Friendship,	La Fontaine,
Calloway,	Harlan, C. H.,	Poor Fork,
Clover Fork,		Smithville.

Harrison County.

Berry's Station,	Colemansville,	Leesburgh,
Boyd's Station,	Connersville,	Oddville,
Broadwell,	Curry's Run,	Raven Creek,
Buena Vista,	*Cynthiana*, (c. h.,)	Robertson's Station,
Claysville,	Havilandsville,	Rutland.
	Kentontown,	

Hart County.

Bacon Creek,	Green River,	Rio,
Clear Point,	Hammonville,	Three Springs,
Glen Brook,	Monroe,	Woodsonville.
	Munfordsville,	

Henderson County.

Cairo,	*Henderson*, (c. h.,)	Steamport,
Corydon,	Poole's Mill,	Wise's Mill,
Hebbardsville,	Smith's Mills,	Zion.
	Spottsville,	

Henry County.

Bethlehem,	Jericho,	Port Royal,
Campbellsburg,	Lockport,	Sligo,
Drennon,	Midview,	Smithfield,
Eminence,	*New Castle*, (c. h.,)	Springport.
Franklinton,	Pleasureville,	

(*To be continued.*)

COAL IN BRAZIL.—It is now evident that a grand coal field exists at St. Catherine (Brazil), of sixty leagues, in an east and west direction, that is, from the sea-coast of the Atlantic Ocean to St. Gabriel, and perhaps much farther; and along the coast, probably 140 or more leagues, beginning from Laguna, in the province of St. Catherine, and continuing south almost to Monte Video. These mines of the Erral, so called, are not of the best quality, but they have not been explored beyond thirty yards in depth, because coal has been found at Arroio dos Katos, much more convenient to the village of Sao Jeronymo, situated on the margin of the River Jacuhy, and the nearest place for embarkation being only two leagues, whilst the mines of Erral are ten leagues off. Sao Jeronymo is twelve leagues to Alegre, situated on the left-hand side of the river, just opposite Triumfo, called in most of the maps Villa Nova. At Arroio dos Katos, the first seam of coal was found by boring-rods, at forty-five yards deep, and the seam is five feet in thickness. It is steam coal of very good quality; some hundred yards of galleries have been worked, which have supplied the steamers of the province. Forty yards below this seam another four-feet seam has been discovered, of even better quality than the five-feet seam. There are many leagues of these two seams. Coals have also been found in many other parts.

GAS IN ENGLAND.—The committee of the Oxford Gas-Light and Coke Company, have announced that from and after the 25th of March last, the price of gas will be reduced to 4s. 6d. per thousand cubic feet.

The directors of the Sheffield United Gas-Light Company, have published their report, recommending the usual maximum dividend with surplus to reserve fund. The profits for the half year (not affected by the reduction in price, which came into operation last January) are, £13,634 2s., and the dividend, after the rate of 10 per cent. per annum on £135,000, class A stock, is £6,750; dividend after the rate of 8 per cent. per annum on the remaining stock, £3,514, making £10,264, and leaving a surplus of £3,099, raising the reserve fund (with interest) to £10,168.

The Glasgow gas-light companies have informed the Lord Provost that they are prepared to reduce the price of gas to the citizens from 5s. to 4s. 7d. per thousand cubic feet. The gas companies have thought it prudent to take this step in consequence of some members of the council advocating the propriety of having a new company.

THE WATER-GAS WAR IN PHILADELPHIA.—Correspondents from various parts of the country inquire what has become of this controversy which, at last accounts, had assumed such a threatening aspect. We left it in this condition: The City Gas-Works had attempted to open the street for the purpose of shutting the gas off the Girard House, when they were stopped by an injunction sued out by the Water-Gas Company. The City Works moved for a dissolution of the injunction, and two or three different days had been fixed for argument, on the last of which, an argument was commenced, when its continuance was adjourned *sine die*. The injunction remains in force meanwhile. What does this mean? Are the City Gas-Works *hors du combat?*

BEATING THE PRUNING HOOK INTO THE SPEAR.—All the world seems bent upon assisting in the laudable work of destroying his neighbor. The last whom we expected to hear of as engaged in this delectable occupation, is the well-known firm of Code, Hopper & Gratz, of Philadelphia, who have suspended the manufacture of gas-meters for the present, in order to fill an order from the United States Government for 500,000 canteens for the use of the army. Their large stock of meters on hand enables Messrs. C., H. & G. to fill all orders that come in, meanwhile.

THE CHEMICAL HISTORY OF A CANDLE.

By Professor Faraday.

A course of Six Lectures (adapted to a Juvenile Audience) Delivered before the Royal Institution of Great Britain.

LECTURE VI.

Carbon or Charcoal—Coal-Gas—Respiration and its Analogy to the Burning of a Candle—Conclusion.

A lady who honors me by her presence at these lectures has conferred a still further obligation by sending me these two candles which are from Japan, and, I presume, are made of that substance to which I referred in a former lecture. You see that they are even far more highly ornamented than the French candles, and, I suppose, are candles of luxury, judging from their appearance. They have a remarkable peculiarity about them, namely, a hollow wick—that beautiful peculiarity which Argand introduced into the lamp and made so valuable. To those who receive such presents from the East, I may just say that this and such like materials gradually assume a change which gives them on the surface a dull and dead appearance; but they may be easily restored to their original beauty if the surface is rubbed with a clean cloth or silk handkerchief, so as to polish the little rugosity or roughness; this will restore the beauty of the colors. I have so rubbed one of these candles, and you see the difference between it and the other which has not been polished, but which may be restored by the same process. Observe, also, that these moulded candles from Japan are made more conical than the moulded candles in this part of the world.

I told you, when we last met, a good deal about carbonic acid. We found by the lime water test that when the vapor from the top of the candle or lamp was received into bottles and tested by this solution of lime water (the composition of which I explained to you, and which you can make for yourselves), we had that white opacity which was in fact calcareous matter, like shell and corals, and many of the rocks and minerals in the earth. But I have not yet told you clearly and chemically the history of this substance, carbonic acid, as we have it from the candle, and I must now take you to that point. We have seen the products, and the nature of them, as they issue from the candle. We have traced the water to its elements, and now we have to see where are the elements of the carbonic acid supplied by the candle; a few experiments will show this. You remember that when a candle burns badly, it burns with smoke; but if it is burning well there is no smoke. And you know that the brightness of the candle is due to this smoke which becomes ignited. Here is an experiment to prove this: so long as the smoke remains in the flame of the candle and becomes ignited, it gives a beautiful light, and never appears to us in the forms of black particles. I will light some fuel which is extravagant in its burning; this will serve our purpose—a little turpentine on a sponge. You see the smoke rising from it and floating into the air in large quantities, and remember now the carbonic acid that we have from the candle is from such smoke as that. To make that evident to you, I will introduce this turpentine burning on the sponge into a flask, where I have plenty of oxygen, the rich part of the atmosphere, and you see that the smoke is all consumed. This is the first part of our experiment, and now what follows? The carbon which you saw flying off from the turpentine flame in the air we have now entirely burned in this oxygen, and we shall find that it will, by this rough and temporary experiment, give us exactly the same conclusion and results as we had from the combustion of the candle. The reason why I make the experiment in this manner is solely that I may cause the steps of our demonstration to be so simple that you can never for a moment lose the train of reasoning, if you only pay attention. All the carbon which is burned in oxygen, or air, comes out as carbonic acid, whilst those particles which are not so burned show you the second substance in the carbonic acid, namely, the carbon, that body which made the flame so bright whilst there was plenty of air, but which was thrown off in excess when there was not oxygen enough to burn it.

I have also to show you a little more distinctly the history of carbon and oxygen in their union to make carbonic acid. You have now a right to know this to a far greater extent than before, so I have three or four experiments for that purpose. I have here a jar filled with oxygen, and here is some carbon which has been placed in a crucible, for the purpose of being made red hot. I keep my jar dry, and venture to give you a result imperfect in some degree, in order that I may make the experiment brighter. I am about to put the oxygen and carbon together. That this is carbon (common charcoal pulverized) you will see by the way in which it burns in air [letting some of the red hot charcoal fall out of the crucible]. I am now about to burn it in oxygen gas, and look at the difference. It may appear to you at a distance as if it were burning with a flame; but it is not so. Every little piece of charcoal is burning as a spark, and whilst it so burns it is producing carbonic acid. I specially want these two or three experiments to point out what I shall dwell upon more distinctly by and by—that carbon burns in this way and not as a flame.

Instead of taking many particles of carbon to burn, I will take a rather large piece, which will enable you to see the form and size, and to trace the effects very decidedly. Here is the jar of oxygen, and here is the piece of charcoal, to which I have fastened a little piece of wood, which I can set fire to and so carry in the combustion, which I could not conveniently do without. You now see the charcoal burning, but not as a flame (or if there be a flame, it is the smallest possible one, which I know the cause of, namely, the formation of a little carbonic oxyd close upon the surface of the carbon). It goes on burning, you see, slowly producing carbonic acid by the union of this carbon or charcoal (they are equivalent terms) with the oxygen. I have here another piece of charcoal, a piece of bark, which has the quality of being blown to pieces—exploding—as it burns. By the effect of the heat, we shall reduce the lump of carbon into particles that will fly off; still, every particle, equally with the whole mass, burns in this peculiar way—it burns as a coal and not like a flame. You observe a multitude of little combustions going on, but no flame. I do not know a finer experiment than this to show that carbon burns with a spark.

Here, then, is carbonic acid formed from its elements. It is produced at once, and if we examine it by lime water, you will see that we have the same substance which I have previously described to you. By putting together 6 parts of carbon by weight (whether it comes from the flame of a candle or from powdered charcoal) and 16 parts of oxygen by weight, we have 22 parts of carbonic acid; and as we saw last time, the 22 parts of carbonic acid combined with 28 parts of lime, produce common carbonate of lime. If you were to examine an oyster shell and weigh the component parts, you would find that 50 parts would give 6 of carbon and 16 of oxygen combined with 28 of lime. However, I do not want to trouble you with these minutiæ; it is only the general philosophy of the matter that we can now go into. See how finely the carbon is now dissolving away [pointing to the lump of charcoal burning quietly in the jar of oxygen]. You may say that the charcoal is actually dissolving in the air round about, and if that were perfectly pure charcoal, which we can easily prepare, there would be no residue whatever. When we have a perfectly cleansed and purified piece of carbon, there is no ash left. The carbon burns as a solid, dense body, that heat alone cannot change as to its solidity, and yet it passes away into vapor that never condenses into solid or liquid under ordinary circumstances; and what is more curious still is the fact that the oxygen does not change in its bulk by the solution of the carbon in it. Just as the bulk is at first, so is it at last, only it has become carbonic acid.

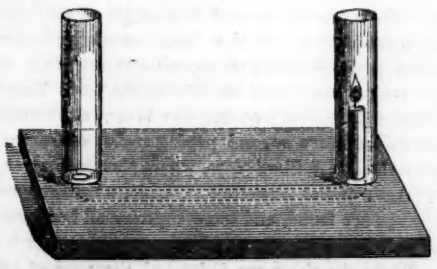
There is another experiment which I must give you before you are fully acquainted with the general nature of carbonic acid. Being a compound body, consisting of carbon and oxygen, carbonic acid is a body that we ought to be able to take asunder. And so we can. As we did with water, so we can with carbonic acid—take the two parts asunder. The simplest and quickest way is to act upon the carbonic acid by a substance that can attract the oxygen from it and leave the carbon behind. You recollect that I took potassium and put it upon water or ice, and you saw that it could take the oxygen from the hydrogen. Now, suppose we do something of the same kind here with this carbonic acid. You know carbonic acid to be a heavy gas; I will not test it with lime water, as that could interfere with our subsequent experiments, but I think the heaviness of the gas and the power of extinguishing flame will be sufficient for our purpose. I introduce a flame into the gas, and you will see whether it will put it out. You see the light is extinguished. Indeed, the gas may, perhaps, put out phosphorus, which you know has a pretty strong combustion. Here is a piece of phosphorus heated to a high degree. I introduce it into the gas, and you observe the light is put out, but it will take fire again in the air, because there it re-enters into combustion. Now let me take a piece of potassium, a substance which, even at common temperatures can act upon carbonic acid, though not sufficiently for our present purpose, because it soon gets covered with a protecting coat; but if we warm it up to the burning point in air, as we have a fair right to do, and as we have done with phosphorus, you will see that it can burn in carbonic acid; and if it burns, it will burn by taking oxygen, so that you will see what is left behind. I am going, then, to burn this potassium in the carbonic acid as a proof of the existence of oxygen in the carbonic acid. [In the preliminary process of heating, the potassium exploded.] Sometimes we get an awkward piece of potassium that explodes, or something like it, when it burns. I will take another piece, and, now that it is heated, I introduce it into the jar, and you can perceive that it burns in the carbonic acid—not so well as in the air, because the carbonic acid contains the oxygen combined, but it does burn and takes away the oxygen. If I now put this potassium into water, I find that besides the potash formed (which you need not trouble about) there is a quantity of carbon produced. I have here made the experiment in a very rough way; but I assure you that if I were to make it carefully, devoting a day to it instead of five minutes, we should get all the proper amount of charcoal left in the spoon, or in the place where the potassium was burned, so that there could be no doubt as to the result. Here, then, is the carbon obtained from the carbonic acid, as a common black substance; so that you have the entire proof of the nature of carbonic acid as consisting of carbon and oxygen. So now, I may tell you that whenever carbon burns under common circumstances, it produces carbonic acid.

Suppose I take this piece of wood, and put it into a bottle with lime water. I might shake that lime water up with wood and the atmosphere as long as I pleased, it would still remain clear as you see it; but suppose I burn the piece of wood in the air of that bottle. You, of course, know I get water. Do I get carbonic acid? [The experiment was performed.] There it is, you see; that is to say, the carbonate of lime, which results from carbonic acid, and that carbonic acid must be formed from the carbon which comes from the wood, from the candle, or any other thing. Indeed, you have, yourselves, frequently tried a very pretty experiment, by which you may see the carbon in wood. If you take a piece of wood and partly burn it, and then blow it out, you have carbon left. There are things that do not show carbon in this way. A candle does not so show it, but it contains carbon. Here, also, is a jar of coal gas, which produces carbonic acid abundantly—you do not see the carbon, but we can soon show it to you. I will light it, and as long as there is any gas in this cylinder it will go on burning. You see no carbon, but you see a flame, and because that is bright it will lead you to guess that there is carbon in the flame. But I will show it to you by another process. I have some of the same gas in another vessel, mixed with a body that will burn the hydrogen of the gas, but will not burn the carbon. I will light them with a burning taper, and you perceive the hydrogen is consumed, but not the carbon, which is left behind as a dense black smoke. I hope that by these three or four experiments you will learn to see when carbon is present, and understand what are the products of combustion, when gas or other bodies are thoroughly burned in the air.

Before we leave the subject of carbon, let us make a

few experiments and remarks upon its wonderful condition, as respects ordinary combustion. I have shown you that the carbon in burning burns only as a solid body, and yet you perceive that after it is burned it ceases to be a solid. There are very few fuels that act like this. It is in fact only that great source of fuel, the carbonaceous series, the coals, charcoals, and woods, that can do it. I do not know that there is any other elementary substance besides carbon that burns with these conditions, and if it had not been so, what would happen to us? Suppose all fuel had been like iron, which, when it burns, burns into a solid substance. We could not then have such a combustion as you have in this fireplace. Here, also, is another kind of fuel which burns very well—as well as, if not better than, carbon—so well, indeed, as to take fire of itself when it is in the air, as you see. [Breaking a tube full of lead pyrophorus.] This substance is lead, and you see how wonderfully combustible it is. It is very much divided, and is like a heap of coals in the fireplace; the air can get to its surface and inside, and so it burns. But why does it not burn in that way now when it is lying in a mass? [Emptying the contents of the tube in a heap on to a plate of iron.] Simply because the air cannot get to it. Though it can produce a great heat, the great heat which we want in our furnaces and under our boilers, still that which is produced cannot get away from the portion which remains unburned underneath, and that portion, therefore, is prevented from coming in contact with the atmosphere, and cannot be consumed. How different is that from carbon! Carbon burns just in the same way as this lead does, and so gives an intense fire in the furnace, or wherever you choose to burn it; but then the body produced by its combustion passes away, and the remaining carbon is left clear. I showed you how carbon went on dissolving in the oxygen, leaving no ash; whereas, here [pointing to the heap of pyrophorus] we have actually more ash than fuel, for it is heavier by the amount of the oxygen which has united with it. Thus, you see the difference between carbon and lead or iron, if we chose iron, which gives so wonderful a result in our application of this fuel, either as light or heat. If when the carbon burnt here the product went off as a solid body, you would have had the room filled with an opaque substance, as in the case of the phosphorus; but when carbon burns, everything passes up into the atmosphere. It is in a fixed, almost unchangeable condition before the combustion; but afterwards it is in the form of gas, which it is very difficult (though we have succeeded) to produce in a solid or liquid state.

Now, I must take you to a most interesting part of our subject—to the relation between the combustion of a candle and that living kind of combustion which goes on within us. In every one of us there is a living kind of combustion going on exactly like that of a candle, and I must try to make that plain to you. For that is not merely true in a poetical sense—the relation of the life of man to a taper—and if you will follow, I think I can make this clear. In order to make the relation very plain, I have devised a little apparatus which we can soon build up before you. Here is a board and a groove cut in it, and I can close the groove at the top part by a little cover; I can



then continue the groove as a channel by a glass tube at each end, there being a free passage through the whole. Suppose I take a taper or candle (we can now be liberal in our use of the word "candle" since we understand what it means) and place it in one of the tubes; it will go on, you see, burning very well. You observe that the air which feeds the flame passes down the tube at one end, then goes along the horizontal tube, and ascends the tube at the other end, in which the taper is placed. If I stop the aperture through which the air enters, I stop combustion, as you perceive. I stop the supply of air, and consequently the candle goes out. But now what will you think of this fact? In a former experiment I showed you the air going from one burning candle to a second candle. If I took the air proceeding from another candle, and sent it down by a complicated arrangement into this tube, I should put this burning candle out. But what will you say when I tell you that my breath will put out that candle? I do not mean by blowing at all, but simply that the nature of my breath is such that a candle cannot burn in it. I will now hold my mouth over the aperture, and without blowing the flame in any way, let no air enter the tube but what comes from my mouth. You see the result. I did not blow the candle out. I merely let the air which I expired pass into the aperture, and the result was that the light went out for want of oxygen, and for no other reason. Something or other—namely, my lungs—had taken away the oxygen from the air, and there was no more to supply the combustion of the candle. It is, I think, very pretty to see the time it takes before the bad air which I throw into this part of the apparatus has reached the candle. The candle at first goes on burning, but so soon as the air has had time to reach it, it goes out. And now I will show you another experiment, because this is an important part of our philosophy. Here is a jar which contains fresh air, as

you can see by the circumstance of a candle or gas-light burning it. I make it close for a little time, and, by means of a pipe, I get my mouth over it so that I can inhale the air. By putting it over water in the way that you see, I am able to draw up this air (supposing the cork to be quite tight), take it into my lungs, and throw it back into the jar; we can then examine it and see the result. You observe, I first take up the air and then then throw it back, as is evident from the ascent and descent of the water, and now, by putting a taper into the air, you will see the state in which it is by the light being extinguished. Even one inspiration, you see, has completely spoiled this air, so that it is no use my trying to breath it a second time. Now you understand the ground of the impropriety of the arrangements among the houses of the poorer classes, by which the air is breathed over and over again, for the want of a supply, by means of proper ventilation, sufficient to produce a good result. You see how bad the air becomes by a single breathing, so that you can easily understand how essential fresh air is to us.

To pursue this a little further, let us see what will happen with lime water. Here is globe which contains

a little lime water, and it is so arranged as regards the pipes, as to give access to the air within, so that we can ascertain the effect of the respired or unrespired air upon it. Of course, I can either draw in air (through A) and so make the air that feeds my lungs go through the lime water, or I can force the air out of my lungs through the tube B, which goes to the bottom, and so show its effect upon the lime water. You will observe that however long I draw the external air into the lime water, and then through it to my lungs, I shall produce no effect upon the water—it will not make the lime water turbid; but if I throw the air *from* my lungs through the lime water several times in succession, you see how white and milky the water is getting, showing the effect which expired air has had upon it; and now you begin to know that the atmosphere which we have spoiled by respiration is spoiled by carbonic acid, for you see it here in contact with the lime water.

I have here two bottles, one containing lime water and the other common water, and tubes which pass into the bottles and connect them. The apparatus is very rough, but it is useful notwithstanding. If I take these two bottles, inhaling here and exhaling there, the arrangement of tubes will prevent the air going

backward. The air coming in will go to my mouth and lungs, and in going out will pass through the lime water, so that I can go on breathing and making an experiment, very refined in its nature and very good in its results. You will observe that the good air has done nothing to the lime water; in the other case nothing has come to the lime water but my respiration, and you see the difference in the two cases.

Let us now go a little further. What is all this process going on within us which we cannot do without, either day or night, which is so provided for by the Author of all things, that He has arranged that it shall be independent of all will? If we restrain our respiration, as we can do to a certain extent, we should destroy ourselves. When we are asleep, the organs of respiration and the parts that are associated with them still go on with their action, so necessary is this process of respiration to us, this contact of the air with the lungs. I must tell you, in the briefest possible manner, what this process is. We consume food; the food goes through that strange set of vessels and organs within us, and is brought into various parts of the system, into the digestive parts especially; and alternately the portion which is so changed is carried through our lungs by one set of vessels, while the air that we inhale and exhale is drawn into and thrown out of the lungs by another set of vessels, so that the air and the food come close together, separated only by an exceedingly thin surface; the air can thus act upon the blood by this process, producing precisely the same results in kind as we have seen in the case of the candle. The candle combines with parts of the air, forming carbonic acid, and evolves heat; so in the lungs there is this curious, wonderful change taking place. The air entering combines with the carbon (not carbon in a free state, but, as in this case, placed ready for action at the moment), and makes carbonic acid, and is so thrown out into the atmosphere, and thus this singular result takes place; we may thus look upon the food as fuel. Let me take that piece of sugar, which will serve my purpose. It is a compound of carbon, hydrogen and oxygen, similar to a candle, as containing the same elements, though not in the same proportion; the proportions being as shown in this table:

SUGAR.

Carbon	72	
Hydrogen	11	99
Oxygen	88	

This is, indeed, a most curious thing, which you can well remember, for the oxygen and hydrogen are in exactly the proportions which form water, so that sugar is compounded of 72 parts of carbon and 99 parts of water; and it is the carbon in the sugar that combines with the oxygen carried in by the air in the process of respiration, so making us like candles; producing these actions, warmth, and far more wonderful results besides, for the sustenance of the system, by a most beautiful and simple process. To make this still more striking, I will take a little sugar, or to make the experiment shorter, I will use some syrup, which contains about three-fourths of sugar and a little water. If I put a little oil of vitriol on it, it takes away the water, and leaves the carbon in a black mass. [The lecturer mixed the two together.] You see how the

carbon is coming out, and before long we shall have a solid mass of charcoal, all of which has come out of sugar. Sugar, as you know, is food, and here we have absolutely a solid lump of carbon where you would not have expected it. And if I make arrangements so as to oxydize the carbon of sugar, we shall have a much more striking result. Here is sugar, and I have here an oxydizer—a quicker one than the atmosphere; and so we shall oxydize this fuel by a process different from respiration in its form, though not different in its kind. It is the combustion of the carbon by the contact of oxygen which the body has supplied to it. If I set this into action at once, you will see combustion produced. Just what takes place in my lungs—taking in oxygen from another source, namely, the atmosphere, takes place here by a more rapid process.

You will be astonished when I tell you what this curious play of carbon amounts to. A candle will burn some four or five, or six, or seven hours. What, then, must be the daily amount of carbon going up into the air in the way of carbonic acid! What a quantity of carbon must go from each of us in respiration! What a wonderful change of carbon must take place under these circumstances of combustion or respiration! A man, in twenty-four hours, converts as much as seven ounces of carbon into carbonic acid; a milch cow will convert seventy ounces, and a horse seventy-nine ounces, solely by the act of respiration. That is, the horse in twenty-four hours burns seventy-nine ounces of charcoal or carbon, in his organs of respiration, to supply his natural warmth in that time. All the warm blooded animals get their warmth in this way, by the conversion of carbon, not in a free state, but in a state of combination. And what an extraordinary notion this gives us of the alterations going on in our atmosphere. As much as 5,000,000 pounds, or 548 tons of carbonic acid is formed by respiration in London alone, in twenty-four hours. And where does all this go? Up into the air. If the carbon had been like the lead which I showed you, or the iron, which, in burning, produces a solid substance, what would happen? Combustion could not go on. As charcoal burns it becomes a vapor, and passes off into the atmosphere, which is the great vehicle, the great carrier for conveying it away to other places. Then what becomes of it? Wonderful is it to find that the change produced by respiration, which seems so injurious to us (for we cannot breathe air twice over) is the very life and support of plants and vegetables that grow upon the surface of the earth. It is the same, also, under the surface, in the great bodies of water, for fish and other animals respire upon the same principle, though not exactly by contact with the open air. Such fish as I have here [pointing to a globe of gold-fish] respire by the oxygen in the air, which is dissolved by the water and forms carbonic acid, and they all move about to produce the one great work of making the animal and vegetable kingdoms subservient to each other. And all the plants growing upon the surface of the earth, like that which I have brought here to serve as an illustration, absorb carbon; these leaves are taking up their carbon from the atmosphere to which we have given it in the form of carbonic acid, and they are growing and prospering. Give them a pure air like ours, and they could not live in it; give them carbon with other matters, and they live and rejoice. This piece of wood gets all its carbon, as the trees and plants get theirs, from the atmosphere, which, as we have seen, carries away what is bad for us and, at the same time, good for them—what is disease to the one being health to the other. So are we made dependent, not merely upon our fellow creatures, but upon our fellow existers, all Nature being tied together by the laws which make one part conduce to the good of another.

There is another little point which I must mention before we draw to a close—a point which concerns the whole of these operations, and most curious and beautiful it is to see it clustering upon and associated with the bodies that concern us—oxygen, hydrogen, and carbon, in different states of their existence. I showed you just now some powdered lead, which I set burning; and you saw that the moment the fuel was brought to the air it acted, even before it got out of the bottle—the moment the air crept in, it acted. Now, there is a case of chemical affinity by which all our operations proceed. When we breathe, the same operation is going on within us. When we burn a candle, the attraction of the different parts one to the other is going on. Here it is going on in this case of the lead, and it is a beautiful instance of the chemical affinity. If the products of combustion rose off from the surface, the lead would take fire, and go on burning to the end; but you remember that we have this difference between charcoal and lead—that while the lead can start into action at once if there be access of air to it, the carbon will remain days, weeks, months, or years. The manuscripts of Herculaneum were written with carbonaceous ink, and there they have been for 1,800 years, or more, not having been at all changed by the atmosphere, though coming under various circumstances in contact with it. Now, what is the circumstance which makes the lead and carbon different in this respect? It is a striking thing to see that the matter which is appointed to serve the purpose of fuel *waits* in its action; it does not start off burning, like the lead, and many other things I could show you, but which I have not encumbered the table with; but it waits for action. This waiting is a curious and wonderful thing. Candles—those Japanese candles, for instance—do not start into action at once like the lead or iron (for iron, finely divided, does the same thing as lead), but there they wait for years, perhaps for ages, without undergoing any alteration. I have here a supply of coal gas. The jet is giving forth the gas, but you see it does not take fire—it comes out into the air, but it waits till it is hot enough before it burns. If I make it hot enough it takes fire. If I blow it out, the gas that is issuing forth waits till the light is applied to it again. It is curious to see how different substances wait—how some will wait till the temperature is raised a little, and others till it is raised a good deal. I have here a little gunpowder and some gun cotton; even these things differ in the conditions under which they will burn. The gunpowder is composed of carbon and other substances, making it highly combustible; and the gun cotton is another combustible preparation. They are both waiting, but they will start into activity at different degrees of heat, or under different conditions. By applying a heated wire to them, we shall see which will start first [touching the gun cotton with the hot iron]. You see the gun cotton has gone off, but not even the hottest part of the wire is now hot enough to fire the gunpowder. How beautifully that shows you the difference in the degree in which bodies act in this way. In the one case, the substance will wait any time until the associated bodies are made active by heat; but in the other, as in the process of respiration, it waits no time. In the lungs, as soon as the air enters, it unites with the carbon, even in the lowest temperature which the body can bear short of being frozen, the action begins at once, producing the carbonic acid of respiration; and so all things go on fitly and properly. Thus you see the analogy between respiration and combustion is rendered still more beautiful and striking. Indeed, all I can say to you at the end of these lectures (for we must come to an end at one time or other) is to express the wish that you may, in your generation, be fit to compare to a candle, and that you may, like it, shine as lights to those about you; that, in all your actions, you may justify the beauty of the taper by making your deeds honorable and effectual in the discharge of your duty to your fellow-men.

Break in the Croton Mains.—On the morning of May 18th it was discovered that a serious accident had taken place by the bursting of the great Croton main on Fifth avenue, in this city, not far from where the great break occurred in December of last year, as reported in full on page 190 of this volume. Vigorous measures were adepted to replace the broken section of the main, and in a short time the water was turned on as usual, greatly to the convenience of the water-takers, who had experienced the trouble of a limited supply for the space of about thirty-six hours.

Sterling Coal.—The attention of Gas Companies is directed to this excellent coal. The present low freights enable Messrs. F. Butts & Co., the proprietors, to ship at a price to which it rarely falls, while their large and increasing contracts fully attest the excellence of this coal, as will appear in their advertisement.

Well or Carbon Oil.—After the great worth of petroleum had been discovered in Pennsylvania, and it had been found as practicable to bore for oil as for salt, attention was directed to the oil springs and salt wells producing oil, in this vicinity. Our geological formation is entirely different from that of Northern Pennsylvania, where the first oil wells were bored. The latter is the Waverly sandstone series, and is, vertically, a thousand or fifteen hundred feet lower than the upper carboniferous rocks, in which we find the oil here. The Waverly rocks are thought now to be yielding three thousand barrels per day, while the carboniferous formation, which is rapidly being developed, now gives, perhaps, twelve or fifteen hundred barrels. It is possible that oil will be found all over the western part of our great Appalachian coal fields. I hear of new oil springs in various directions, almost every day. This would indicate that the conditions essential to the generation of oil have been present over a large area. These conditions are not completely understood, and yet we are rapidly accumulating data for scientific conclusions. We are warranted in the belief that the oils are the product of distillation at a very low temperature, from coal and bituminous slates. The oil in the Waverly sand rocks is, without doubt, produced from underlying bituminous shales, which are very thick. This process of distillation, or vaporization, is doubtless going on at the present time, though slowly. The vapor rising from the bituminous strata enters every possible crevice, and bubbling up through the water in those crevices, is partly condensed into oil, which floats upon the water, and partly remains uncondensed in the form of inflammable gas. As the process goes on, more and more oil is formed, and more and more gas is pent up in the space over the oil. If the fissure has an outlet the gas will escape, and the water, as it circulates through the earth, will bring out through the outlet more or less oil. The whole tendency of the oil is upward. The vapor which forms it rises, and the subterranean waters lift it up. I have found oil springs on steep sids hille, a hundred feet above the valley below. Hence, as a general thing, we should expect the oil at greater or less elevations above the bituminous strata from which it is produced.

If this position be true, that the oil is condensed from vapor generated from coal and other bituminous strata, it becomes a matter of importance to know under what circumstances the oil may be accumulated in large quantities. If there were no fissures whatever in the rocks, if all overlying strata, and especially the more compact and impervious clay shales and limestones, were perfectly firm and unbroken, we should expect to find no oil; indeed, under such circumstances, the oil vapor could hardly be formed at all, there being no room for expansion. If, on the other hand, the rock is full of fissures, we should expect the oil to accumulate slowly in them. To what extent the rocks of Washington county contain such fissures, it is impossible to determine beforehand. There are evidences of a geological disturbance, in the form of an uplift, on both sides of the Ohio river at Newport. This disturbance can be traced up Cow creek, Va., and on south for thirty or forty miles, to the great wells on Little Kanawha. In some places along this line the rocks are inclined at an angle of fifty degrees with the horizon. It is a little remarkable that at so many points on this line the oil is found, viz., at the Burning Spring (Rathbone's); on the Little Kanawha, Wirt county, Va.; on Hughes river, at Petroleum, where there are several paying wells; at Cow creek, near the late Willard place, where there are strong oil springs; and at Newell's run, Ohio, where gas and oil springs are found, and some superior oil has been obtained.

Where the strata are dislocated there are of course more fissures and crevices in which the oil may be accumulated. But it should be borne in mind that no well is inexhaustible. No fissure can endure the drain of a steam-pump for a very long time. There must, of necessity, be a diminution of supply. There are no great reservoirs of oil, no subterranean lakes which may afford an almost indefinite supply of the precious fluid. There is no evidence that the oil is found anywhere except in crevices, which are more or less vertical. Where several wells are in the same neighbor-

hood, it would be unusual to find them "striking oil" at the same depth below the surface. I know of a productive well twenty-three feet deep near another productive one which is over two hundred feet deep. Of course, then, there can be no such thing as a special oil rock or stratum. The oil is in fissures which may be found in every kind of rock. We sometimes hear men, who have bored wells in Northern Pennsylvania oil region, speak very positively of our rocks, and declare the exact depth, and in what peculiar kind of rock, we may find the oil here in the Coal Measures. All such claims are idle, because it is impossible to reason analogically between two entirely distinct groups of rocks which lie fifteen hundred feet apart in vertical distance. There is with us, in this region, no oil rock. You may "strike oil" 30 feet down, or at 300 feet down. Nor, again, can anything be determined beforehand from the form or proximity of the hills. Some would bore at the entrance of a side valley, others at the point of a bold, high hill. Both are right if they happen to strike an oil fissure, and wrong if they do not.

Some, again, having found a fissure from which oil exudes, would begin to bore in the top of the fissure. This is a doubtful policy, for all *cracks* deviate more or less from a perpendicular line, and a well bored prependicularly would be sure to lose the fissure.

Again, little can be learned from oil springs in regard to the *quantity* of oil below the surface. A comparatively small fissure with little oil in it, if there be much water to force up the oil, might make quite a show of oil, while a large fissure nearly filled with oil might have no outlet whatever. An oil spring is of no value except to show that in that locality the conditions essential to the generation of oil have been present. The quantity of oil can only be learned from actual experiment. *You are sure of a paying well after you have found it; never before.*

Oil signs are often fallacious. There is sometimes a film upon water that resembles oil, which is not oil. The little globules sometimes detached from a rock, or from sand and mud, and which rise upon the water, and break and spread themselves, often giving out most brilliant colors, are unmistakeably oil. But the film which appears as you dig in the mud and ground must be received with great caution. There is sometimes on streams below oil springs a collection of scum, of yellowish brown color, which is the paraffin of the oil, and without odor. This scum so greatly resembles another kind found on almost all running brooks that there is great difficulty in making the distinction. There is also a kind of iron rust often found upon standing or sluggish water, that somewhat resembles oil. It, however, readily breaks up, and if collected ina vial will sink to the bottom.—*Prof. Andrews, of Marietta, Ohio.*

New Discovery in Gas.—The invention of Mr. Webster, of the Phœnix Chemical Works, Birmingham, is at the present moment creating considerable excitement amongst the analytical chemists and scientific men of that borough, and we are, therefore, pleased in being able to publish some of the facts connected with experiments made during the present week, as we think they will prove highly interesting to our readers. Our correspondent attended, on Monday evening, a meeting held at the above works, at which a large number of gentlemen interested in the subject assembled. From the experiments presented he elicited the following facts: That the oxy-carbon gas, patented by Mr. Webster, is a combination in certain proportions of oxygen with certain parts of carbon, the particulars of which he is not at liberty to make known till the publication of the specification, which will shortly appear in this Journal. The light produced by the oxy-carbon gas is one whose purity and brilliancy almost extinguishes the flame of an ordinary gas-light or candle, which looks smoky and opaque when brought into close proximity. The new light is as 16 to 1 of ordinary gas-light. By the application of a reflector the light is thrown to a distance of 20 yards with such effect that a person is enabled to read a letter or the smallest print by it. The radiating heat is not greater than that of ordinary gas, as the oxygen, being supplied from the inner portion of the flame, does not require to partake of the inner air of the room, so that the burner is not consumed or damaged by the action of the flame in any way, but is kept comparatively cool. The oxygen can be absorbed and reburnt as frequently as desired, by a chemical process altogether original, even increasing the value of its properties pecuniarily. The new gas is obtained at a less expense than the ordinary gas, because the oxygen is less expensive by 90 per cent. than that generally employed, since ¼ of oxygen would be found equal to ¼ of carbon, although securing a register by the photometer of 30 to 1 in favor of the oxy-carbon gas over that in general use. In ordinary gas-light shown to consume 6 feet per hour, the register gives 15 candles; but in the oxy-carbon gas patented by Mr. Webster, the register shown by the photometer is 240 candles.

Another and a peculiar feature of the new patent gas is, that though the burner escapes injury from the flame, the light itself possesses a powerful heat in its centre, which will not only melt iron wire, but platinum and rubies; experiments demonstrated that iron wire twisted was instantly melted, and platinum almost as quickly, when placed in the flame emanating from a blow-pipe. To braziers, jewelers, solderers, &c., it would appear that this invention will be invaluable. Experiments were not only made with ordinary Argand burners, but with oil and paraffin lamps having wicks, each and all of which showed a similar register when the gas was applied. Mr. Webster also exhibited a lamp for light-houses, to which he demonstrated by experiment his oxy-carbon was equally applicable. We understand that Mr. Wilkins, the engineer from Trinity House, London, has been down to Birmingham to witness Mr. Webster's experiments, and that arrangements are being made for lighting up with the oxy-carbon gas the lighthouses of that establishment. The apparatus of Mr. Webster is remarkably simple in its construction, so much so, indeed, that an ordinary person can generate the gas and arrange the light. The new gas is not explosive, and can be regulated to any extent, so as to adapt it to a private office or room, to a public building, to street-lights, or light-houses, and to railways and railway carriages. One light in a public building or manufactory, will be equal to 16 ordinary gas lights; and the inexpensive character of its production will, it is asserted, reduce the expenditure of lighting at least 90 per cent. The gentlemen present appeared to be highly delighted with the successful experiments of Mr. Webster, and retired acknowledging that the light in question was all he had represented it to be, and thanking him for the demonstrations which he had kindly presented. We understand that a company is in the course of formation for the purpose of carrying out the principle of the new patent.—*London Mining Journal.*

Early Discovery of Oil Wells.—In Venango, Pa., and the bordering counties, where the people live, talk, and even swear by their oil wells, the newspapers content themselves with discussing the origin of these singular natural productions. The *Spectator man*, who is "well up in his catechism," finally carries off the palm by establishing Job as the first man that ever sprung a well. It says:

"In Job xxxix, 6, the text reads—'The rock poured me out rivers of oil.' This is the oldest record of the petroleum business, and more ancient than the accounts of the discovery of oil in Burmah, which dates back only some 400 years. Job was a rich man, and probably owned a forty barrel well. He was the first operator in petroleum of whom we have any account, though oil is also mentioned in Deuteronomy, xxxii, 13."

"Well" done, Job!

Prismatic Colors of the Electric Light.—Electric light of great brilliancy, exhibits like the sunlight, all the prismatic colors when decomposed by the prism, and may be caused to display them separately by the intervention of different media. If a powerful discharge be passed between two wires inserted in a soft piece of deal, in the direction of the fibres, the color of the light varies with the depth of the points beneath the surface. If one of the points be inserted rather deeper than the other, all the prismatic colors appear. In this experiment, the depth beneath the surface of the wood may be from 1-16 to 3-16 in.

THE COAL TRADE OF GREAT BRITAIN.

Statistics.

The annual return of coals, cinders, culm, and patent fuel shipped coastwise at the several ports of England, Scotland, and Ireland, to other ports of the United Kingdom; and also of the quantities exported to foreign countries and British settlements abroad during 1860, as compared with the preceding year, has just been issued, and shows a slight improvement (about 5 per cent.) in the quantities shipped, whilst the average price per ton has somewhat receded. The subjoined tabulated statement shows the shipments coastwise and the exports during the last two years:

COASTWISE.

	Coals.	Cinders.	Culm.	Total.	Pat. fuel.
	Tons.	Tons.	Tons.	Tons.	Tons
1859.....	9,913,595	45,991	148,247	10,107,833	29,190
1860.....	10,522,126	40,203	158,387	10,720,716	26,197
Inc.,.. ..	608,531	.....	10,140	612,883	.....
Dec.,....	.....	5,788	.....	.....	2,993

EXPORTS.

	1859.		1860.		Increase.	
	Tons.		Tons.		Tons.	
Coals....	6,784,337	£3,113,487	7,060,388	£3,141,507	276,051	£28,020
Cinders.	213,579	154,419	247,761	171,827	34,182	17,408
Culm...	9,033	2,107	13,683	2,947	4,650	840
Total...	7,006,949	£3,270,013	7,321,832	£3,316,281	314,883	£46,268
Pat. fuel	75,080	45,266	90,743	55,350	15,663	10,084

For coals France is still our best customer; but, notwithstanding the existence of the Commercial Treaty of 1860, which was not in force in the preceding year, there has actually been a decrease in the quantity taken by that country from 1,376,890 tons to 1,335,053 tons; whereas a very considerable increase was contemplated. To the United States the shipments have increased from 204,516 tons in 1859 to 309,869 tons in 1860. To Hamburg the exports were 477,587 in 1860, against 473,130 tons in the preceding year. To Denmark there has been a diminution from 450,556 tons in 1859 to 409,196 tons in 1860. To Italy the increase has been from 347,326 tons to 442,798 tons. To British India the increase has been from 164,630 tons in 1859 to 289,096 tons in 1860; and to China (including Hong Kong) the increase has been from 93,000 tons to 139,000 tons. Taking a general view of the return, the variations can only be regarded as trifling—a circumstance which may, perhaps, be accounted for by the universal depression which has prevailed having prevented the ordinary increase, and through Australia becoming each year better able to supply herself with mineral fuel.

From an analysis of the statements of quantities exported, and the declared value thereof, it appears that the average price per ton of coal exported has been upwards of 3d. per ton less in 1860 than in the preceding year; the average price per ton in 1859 was rather more than 9s. 2d., whilst that for 1860 was about 8s. 10¾d. The superiority of the Welsh coal, as compared with the North Country coal, appears to be gradually becoming more universally admitted; for, although both the Welsh ports and the North Country ports show an improvement, the proportional increase for the Welsh ports is somewhat greater than that for the Northern ports.

The consumption of patent fuel has decreased in this country, but, owing to an augmentation in the export trade, the total shows an increase, amounting to rather more than ten per cent.—With regard to price, about 2d. per ton more was obtained in 1860 than in the preceding year. The quantity of coals brought into London was, in 1860, coastwise, 3,573,377 tons, against 299,170 tons in 1859; and by inland navigation and land carriage, 1,499,899 tons in 1860, against 1,210,776 tons in 1859. The import of patent fuel into London was 18,951 tons in 1860, against 20,642 tons in the preceding year.—*London Mining Journal.*

Reduction in the Price of Gas in England.—The Romford Gas Company have resolved to reduce the price of their gas from 6s. to 5s. 6d. per 1,000 cubic feet.

The Oxford Gas-Light and Coke Company, have announced a reduction in price from 5s. to 4s. 6d.

The gas consumers of Swansea have invited a committee who obtained a reduction in the price of gas from 5s. 10d. to 4s., to a public dinner in acknowledgment of their obligations to them.

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is the recognized official organ of

LIGHT, HEAT, WATER-SUPPLY AND SEWERAGE.

Its purpose is to ascertain and make known all new discoveries in the science and economical application of LIGHT, and promote thereby the interests of companies and consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities, and to improve the system of SEWERAGE, VENTILATION, HEATING, and DRAINAGE everywhere.

THERE ARE 20,000 CITIES AND TOWNS IN THE UNITED STATES, CAPABLE OF SUPPORTING GAS-WORKS, WHILE THERE ARE NOT 400 GAS-WORKS IN OPERATION IN THE WHOLE COUNTRY!!!

TERMS—CASH IN ADVANCE.

SUBSCRIPTION—In the U. S. and British Provinces. $3 per annum.

ADVERTISEMENTS—According to position and space occupied. For particulars of which please address the Proprietor.

☞ Remittances by mail to be addressed to the proprietor,

JOHN B. MURRAY,

Rooms of the AMERICAN GAS-LIGHT JOURNAL,

No. 39 Nassau st., cor. of Liberty st., opposite the Post-Office. New York City.

AGENTS OF THE AMERICAN GAS-LIGHT JOURNAL.

FOREIGN.

Germany .....B. WESTERMAN & Co., of New York.

Great Britain....TRUBNER & Co., 60 Paternoster Row, London, where single copies may always be found,

Paris, France. ..{ LE JOURNAL DE L'ECLAIRAGE AU GAZ, 25 Boulevard Poissonnière.

DOMESTIC.

V. HAROLD MYERS, No. 152 South Fourth st., Philadelphia.

The AMERICAN GAS-LIGHT JOURNAL can be purchased of all the newspaper and periodical dealers in the U. States and Canadas.

THE

AMERICAN GAS-LIGHT JOURNAL,

PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

PROPRIETOR, JOHN B. MURRAY. | EDITOR, C. ELTON BUCK.

SATURDAY, JUNE 1, 1861.

RENEW YOUR SUBSCRIPTIONS.

The next number will complete the second volume of the JOURNAL, *when it will be discontinued to all whose subscriptions have expired and not been renewed.* This course is found to be absolutely necessary, owing to the trouble and expense of collecting the small sums by correspondence all over the world. It is vastly easier for several thousand subscribers to enclose $3 each, with their address, than for one person to dispatch as many bills or letters.

British subscribers will please remit to Messrs. Trubner & Co., No. 60 Paternoster Row, London. French and German subscribers to Le Journal de l' Eclairage au Gaz, No. 25 Boulevard Poissoniere, Paris. American, Canadian, and South American subscribers, will enclose to—

THE AMERICAN GAS-LIGHT JOURNAL,
No. 39 Nassau Street, cor. Liberty,
New York City.

The construction of furnaces, and the proper regulation of temperatures, where much heat is required, is a subject demanding the closest attention. Not only from economical considerations as regards the quantity of fuel used, but also on account of the variable effects likely to be produced on the article which may happen to be undergoing the process of manufacture—this subject should be attentively studied, and to do this requires no small degree of application. To state that at present, furnaces, ovens, and other appliances for submitting substances to an elevated temperature, are not uniformly constructed to obtain the requisite degree of heat, and at the same time to economize in fuel, would be merely the announcement of a fact patent to the minds of all who have had any experience in the management of manufacturing establishments.

The proper regulation of temperature in the retort oven, is a matter of great importance to the gas-engineer, and as the first operation in the generation of gas falls strictly within the province of this subject, it should be thoroughly understood. The construction of the retort house in many works, is essentially similar, and to all external appearance, a plan of management adopted in one, would do for others. But it must be understood that a very slight and imperceptible difference in the arrangement of the interior of the oven—the placing of the tiles, the form of the flues, the configuration of the stack—all these may vary in some particulars, and materially change the uniformity of action which might be otherwise anticipated. It being impracticable—in fact almost impossible—to build a furnace whose exact consumption of fuel, and results of its combustion can be predicted with certainty, these data can be obtained by practical essays alone; and only after actual work has been performed, the capability of the furnace is known.

In the substitution of clay for iron retorts, much attention should be paid to properly conduct the preliminary essays, by regarding the construction of the oven, the correct disposition of the tiles, and the arrangement of the flues.

The different modes of setting those retorts, each of which has its advocates, should be carefully studied, and the effect of the same, when in actual operation, should be accurately noted. Very much of the efficacy of clay retorts—indeed the whole question of their value—depends upon their being properly placed in the oven, and the flues being suitably arranged so as to produce the largest possible effect with an economical use of fuel. We have known instances where clay retorts have been introduced, and placed in the oven without paying a due share of attention to the proper arrangement of the supporting tiles, and the consequence was, a very poor opinion respecting their merits was entertained by the experimenter, until the true state of the case having suggested itself, the defect was remedied, and the real value of the retorts was fully proved. We have since then heard of several instances in which clay retorts have been condemned, after apparently faithful trials, and the use of iron resumed, and yet after such universal testimony in their favor, who can doubt but that the real cause of the difficulty lay, not in the retorts themselves, but in the construction of the oven and the arrangement of the tiles. This must be the true solution of the dilemma, for while such abundant testimony can be adduced in favor of clay retorts, and their superiority over iron is so fully asserted, we have known of but few instances where they have not been adopted after careful experiments to test the question of their comparative value.

WASTE OF WATER.

A perusal of the reports of the various water-companies supplying our principal cities, will exhibit the alarming recklessness and extravagance prevalent all over the country in the use, or rather abuse of water. If the cities referred to had completed their growth, no great exception could be taken to this copious use. But it must be remembered that the progress of the towns and cities of this country is very rapid, and the census returns exhibit a steady and vigorous increase. The water-works of most of these places were constructed more with a view to present necessities, or, at farthest, but slight notice was taken of future emergencies. In view of the future prospects of growing towns, and the enlarged demands which may be expected upon their sources of water supply in the ratio of natural increase, it becomes a study of great importance as to the maintenence of this supply, and the probability of its being ample for future necessities.

In the report of the Cochituate Water Board of Boston, Mass., it is stated that the amount of water used during the year averaged the enormous amount of 97 gallons to each individual daily! Such an unreasonable abuse of water privilege as this is without a parallel, we believe, and it should be immediately checked. If it continues in this ratio, the inhabitants of Boston may, with some show of reason, feel alarmed lest their city will, at no very distant day, experience the inconvenience of a limited supply. These remarks, however, do not apply to Boston alone, but may be suggested in reference to other cities where similar extravagance occurs.

The remedy for this extravagance is simple and easily applied. We have repeatedly urged on our water companies the importance of introducing meters into general use as a means of effectually checking such wastefulness. Such instruments are now made, and their correctness has been abundantly tested. The evidence of the many companies which have made the experiment of using them attached to the service pipes of large consumers, has been very satisfactory as regards their value. All companies—particularly those whose supply is limited—would do well to give them a fair and faithful trial, and we are convinced their interests would be largely promoted by introducing them into general use. This subject is worthy of the attention of the engineers of water-works, and we hope they will award it a full share of consideration.

OUR CIVIL WAR.

The daily papers convey such full and reliable details of the war in this country, it is not deemed necessary to lumber up the pages of the JOURNAL with a repetition of them. Its effect upon the interests represented by us, is not as disastrous as upon many others, still, advertisers feel it more or less, and we shall continue to move on, quietly and cautiously, until Peace shall have again let slip the wheels of trade, when we hope to "make a noise" with the rest of our craft.

THE "LIGHT" GUARD OF THE NORTH.

Various Gas-Light Companies have initiated a movement of great importance to the North, and reflecting great honor upon their own loyalty and generosity. It is the organizing, arming, and equipping their workmen for home or foreign service.

The Manhattan Gas Company led the way by selecting 1,000 men from their retort houses and street gangs, appropriating $5,000 towards their equipment, under Col. Charles Roome, President of the Company, and Major Theodore W. Parmele, son-in-law of the Colonel.

The Cincinnati, O., Gas Company has mustered a company of 120 men for the same service, and no doubt other gas companies will do the same. These troops may be emphatically termed the "Light" Guard of the North. The hardy fellows are accustomed to eat fire and drink smoke, and if called into action, their enemies will think they have come across the devil himself.

CINCINNATI, O., GAS-LIGHT COMPANY AS A HOME GUARD.—The example set by the Manhattan Gas-Light Company of this city, in organizing and arming its workmen as a Home Guard, has been followed by the Cincinnati Gas Company.

An organization meeting of the "Independent Light Guards," composed exclusively of the employees of the Cincinnati Gas Company, was held on the 1st May. This company consists of 120 picked men, all stalwart, hard-working mechanics, employed at the Gas Works, and are to be fully equipped (for active service, if necessary) at the expense of the Gas Company. The uniform is the fatigue dress of the United States army, except the trimming, which is iron-grey.

An election of officers was held, when the following gentlemen were elected:

Captain—John Westwood.

1st Lieutenant—S. S. Stratton; 2d, Robert Martin; 3d, Fred. Jeffrey.

Ensign—P. Kean.

Orderly Sergeant—R. Mowle; 2d, John Sykes; 3d, A. Dewire; 4th, U. Rainer.

1st Corporal—C. Mulvey; 2d, John McKenzie; 3d, Wm. Murphy; 4th, Jno. Fure.

A competent drill sergeant has been employed by the Gas Company, and the Guards are drilling daily from three to four hours. This company will do good execution if occasion should offer. They are what the Souuthern aristocrats call "greasy mechanics."

OUR NEW DRESS.—On May 1, we came out, as our readers doubtless observed, with new type, and better paper, and had not the war stepped in at the moment, we would have inaugurated further improvements which are now delayed until the return of peace.

ANSWERS TO CORRESPONDENTS.

A. H. P., of Conn.—*Not that we know of. The reports concerning the experiments are very conflicting, and until the official account is published they should be received with many grains of allowance.*

L. R., of N. Y.—*Bunsen's work on Gasometry is the most complete treatise on the subject and should be owned by all who desire thorough instruction on the science. The English translation is beautifully printed, and illustrated with handsome woodcuts.*

C. I. L., of N. Y.—*A natural chemical reaction similar to the one you describe is going on in the Schuylkill river, near the city of Reading, Pa. That river and its tributaries, flowing from the coal formations, hold in solution large quantities of sulphuric acid, formed by the oxidation of the sulphur in the coal-mines. On reaching the neighborhood of Reading the river enters the limestone formation, and absorbs many streams holding lime in solution in their waters. At this point the chemical action commences, the sulphuric acid and the lime uniting to form sulphate of lime, which is subsequently deposited in the bottom of the river; and the water, freed from its former impurities, is rendered perfectly wholesome for the supply of a large city, and well adapted for manufacturing purposes where great purity is requisite.*

O. E., of Pa.—*We have not heard of the process being introduced except in the town we mentioned. We will keep a sharp look-out on the subject, and report in our columns anything that may be interesting in connection with the matter.*

A. T. P., of Mo.—*We believe there is no vitality remaining in the Callaway Company, although the property they own is said to be very valuable. The company's office is in Philadelphia.*

A. R. D., of Wis.—*Crude petroleum contains a number of hydro-carbon oils, some of them being very light and highly explosive. Serious accidents have occurred from the use of oils which have not been properly refined. When they have been made in a careful manner, they give a light far pleasanter to the eye than gas, and are quite as free from danger of explosion.*

Chemicus, of Iowa.—*Your theory is certainly a novel one, but will not stand the test of time. The reaction has already been satisfactorily explained in many works. Knapp has a full account of it, and you would be profited by reading it.*

A. M., of Wis.—*It was organized about three years ago, and is said to be in a highly flourishing condition.*

PURIFICATION OF COAL-GAS FROM BISULPHIDE OF CARBON.

By the Rev. W. R. Bowditch.

(Read before the Royal Society of London.)

(Concluded from page 350.)

SULPHUR COMPOUNDS IN GAS PURIFIED SO AS NOT TO AFFECT BASIC ACETATE OF LEAD, AND THEIR REMOVAL.

A recent Royal Commission on lighting picture galleries has stated the large quantity of sulphur found in some London gas, and has intimated a doubt about the possibility of its removal. Dr. Letheby concludes, from seven years, examination of gas in London, that though quite free from sulphide of hydrogen, it contains, on an average, 200 grains of sulphur in 1,000 cubic feet; and Dr. Frankland, in the new edition of "Ure's Dictionary of Arts," part iv., pp. 730, 731, writes: "It is probable that volatile organic compounds of sulphur are produced by the action of this element with carbon and hydrogen simultaneously, although we have as yet no positive evidence of their presence in illuminating gas. . . . . When once generated with coal gas, all attempts to remove these constituents have hitherto proved ineffectual, and there seems little ground for hope that any practicable process will be devised for their abstraction." I have now the honor to submit evidence of the existence of these sulphurized compounds, and also a practical process for their removal. My attention was specially drawn to this subject by a conversation with the manager of a London gas-work. He informed me that he not unfrequently filled his gas-holders with gas which would not affect acetate of lead, and that after the gas had been stored a few hours, it became so foul as to blacken lead-paper the instant it was applied. He sought an explanation of this phenomenon; and, as the water of his gas-holder tanks was clean, and there was no accidental sources of sulphide of hydrogen, I concluded that an organic compound, containing sulphur and hydrogen, had been broken up, and that the sulphide of hydrogen was thus produced. I learnt, also, by other observations, that gas which went to the gas-holders free from ammonia, sometimes became ammoniacal if kept, and joining this fact with the former one, inferred that the compound which thus broke up contained nitrogen as well as sulphur and hydrogen. Subsequently, I observed that the saturated clay taken from the purifiers of gas-works, contained a quantity of foul naphthalin. This led me to procure a quantity of (so-called) naphthalin which had been taken from the mains of a London gas-work, and which, therefore, must have been deposited by purified gas. Some portions of this naphthalin were white, but others were slightly darkened by the presence of carbonaceous matter, and the whole was in *fine powder*, aggregated together by the process of deposition. The tendency to form exceedingly small crystals seems a constant characteristic of naphthalin which has been deposited in gas-pipes, for by no amount of care and trouble have I been able to obtain it in large crystals, though the solutions from which it has crystallized have been months in evaporating. With naphthalin from tar, on the contrary, I have obtained, from an etherial solution, crystals an eighth of an inch thick, nearly half an inch broad, and more than half an inch in length. The supposed naphthalin from gas-pipes dissolves wholly in ether and hot alcohol, and crystallizes from the spirit on cooling as pure naphthalin does. The solutions are neutral to test papers. Boiled with an alcoholic solution of potash, it evolves no ammonia, and with hydrochloric acid no sulphide of hydrogen. Heated alone, it evolves first ammonia, and then sulphide of ammonium, mixed, I think, with a trace of bisulphide of carbon, and then distils. Several samples began to give off their ammonia at 388° Fahr., and sulphide of hydrogen at 422° Fahr., leading to the hope that here was a compound of definite composition which would admit of correct analysis and perhaps of formulation; but some more of the naphthalin, produced, like the other, from Newcastle coal, but at another gas-work, possessed such different physical properties as to convince me that very much more must be known of this substance before any reliable analyses can be published. The latter sample gave a neutral solution in spirit, like the other, but of a considerably browner color. When heated alone, it gave off ammonia with ebullition at 218° Fahr., and then became tranquil. When the temperature reached 375° Fahr., it began to evolve sulphide of hydrogen, which continued to increase in quantity up to 390° Fahr., when it nearly ceased, and quite ceased at 410° Fahr. The proportion of tar in this sample was much greater than I have seen it in any other. Subsequently, I obtained some more naphthalin which had been deposited in the pipes of another London gas-work, and this, like the former, contained both nitrogen and sulphur, which were evolved upon distillation as sulphide of hydrogen and ammonia.

Having thus obtained one sulphurized hydro-carbon and determined the temperature at which its sulphur and nitrogen could be obtained as easily as removable compounds, I was prepared to advance towards a better purification of gas, with great probability of success. Another well confirmed observation helped to guide me. Gas, freed from every trace of sulphide of hydrogen, always blackens lead-paper strongly when passed through clay; and, if it be subsequently passed through lime, it affects turmeric, though quite free from ammonia when taken for experiment. This process may be repeated through a series of ten or twelve purifiers, containing clay and lime placed alternately, the test-papers being less affected at each purifier, until at length they are not discolored at all. This experiment has been made upon gas produced in various parts of England and Scotland from many kinds of coal, and I think the number of instances sufficient to justify the conclusion that *all* gas, as sold, contains the compound from which clay liberates sulphide of hydrogen. I have not yet been able to separate the compound upon which clay thus acts. I have, however, ascertained that the clay which has liberated sulphide of hydrogen from gas which did not affect test-papers when taken for experiment, contains tar, which may be dissolved out by alcohol, and may be obtained alone by evaporating the solvent.

Although collateral matter has been carefully excluded from this paper, I cannot refrain from remarking that the property of clay here mentioned is in fact the announcement of a new property of soils, and one which will help to account for the formation of many natural metallic sulphides. I hope soon to have some investigations of this subject ready for publication.

To ascertain whether this property of breaking up a sulphurized compound in purified gas and removing tar, was possessed by clay alone, or shared by other substances used in purification, some purified gas was passed through a considerable chemical excess of all the substances employed in purification—viz., lime, precipitated peroxide of iron, sulphate of iron, chloride of calcium, and dilute sulphuric acid, all but the lime being mixed with moist saw-dust. Upon passing the gas next through a purifier filled with clay, it darkened lead-paper, and affected turmeric when it had passed a subsequent purifier filled with lime. This proves the power of clay to break up one or more sulphurized compounds, which no other substance used in purification effects; and if this sulphur were not liberated from the impure naphthalin compound already mentioned, it seemed certain that gas which had been previously purified by clay might be much improved, if not rendered pure, by a removal of the sulphur of the naphthalin. There is strong experimental evidence that the compound from which clay liberates sulphide of hydrogen is not the sulphurized naphthalin one; for, if hydrogen be passed through a vessel containing this substance, then through clay, and subsequently over lead-paper, no trace of sulphide of hydrogen is found, though the gas passing smells strongly of impure naphthalin. This gas and vapor burn with a lightless flame. Subsequently, some naphthalin was heated to ebullition, and a current of hydrogen sent through it, and then burnt. The flame was lightless as before. I mention this fact to remove the popular error that naphthalin, as it exists in coal gas, is a good illuminant. Even Dr. Franklin thus regards it; and both in Clegg's book on coal gas, and in the new edition of Ure's Dictionary, states that the hydrocarbons in gas are valuable in proportion to the carbon they contain, and that naphthalin is the most valuable as containing the largest proportion of carbon. The above-mentioned experiments evince the contrary. On another occasion I determined the illuminating power of some gas, and then, without alteration of the quantity passing, sent the gas through a U-tube, containing naphthalin from the London gas mains. The character of the flame was changed from white to red, but the photometer indicated no difference in the light given. Two other persons conversant with photometry were present at this experiment, and agreed in the result, though up to that time they had held the prevailing opinion as to the value of naphthalin in gas, without testing the statements made upon the subject.

Another sulphur compound is said always to be present in coal gas, and to be irremovable, and which, like those I have hitherto spoken of, does not affect lead-paper—viz., bisulphide of carbon. To ascertain the presence of bisulphide of carbon, I pass gas through strong spirit of wine (methylated spirit answers perfectly, kept at about 160° Fahr. The gas and vapors pass out of the flask which contains the spirit, up a long tube, into an inverted flask, so that all which is condensed may run back into the spirit. It then passes into another flask, for additional condensation, and thence, forward, to a gas-holder or burner. Bisulphide of carbon, dissolved in spirit, becomes precipitated as a white cloud, which settles to the bottom of the vessel, when the spirit is copiously diluted with water. The white, cloudy precipitate escapes slowly by single bubbles through the diluted spirit, and at length leaves a solution perfectly clear. The spirit through which gas has passed, and from which it has abstracted bisulphide of carbon, acts in precisely the same manner upon dilution, and no one who has seen the reaction once or twice can possibly mistake it. The study of other compounds led me to conclude that, if this substance exists *as such*, and not merely *by its elements*, in gas, it could be removed almost as easily as the naphthalin compound could be purified, and that the same process could be made available to remove the sulphur of both. I thought that, under certain conditions, the affinity of hydrogen for sulphur would exceed that of carbon for sulphur, and, therefore, that I might obtain the sulphur of bisulphide of carbon as a sulphide of hydrogen, about the removal of which there is no difficulty. Experiment confirms the reasoning. When

hydrogen, mixed with vapor of bisulphide of carbon, is passed through a tube filled with slaked lime or clay, which has been dried at 400° or 500° Fahr., and is kept between 400° and 600° Fahr., during the passage of the gas and vapor, not a trace of bisulphide of carbon passes from the tube, but sulphide of hydrogen does pass. The lime is darkened by a deposit of carbon, and a sublimate of sulphur is found in the exit tube. A considerable excess of hydrogen should be used, or else a portion of the bisulphide of carbon vapor is carried over by the current, and escapes decomposition. That this reaction is not the result of heat merely, but is a truly chemical one, which the base, under the influence of heat, effects; and the remarkable fact, that slaked lime, when heated, forms, but does not unite with, sulphide of hydrogen, receive illustration from the following experiments:

Hydrogen and vapor of sulphide of carbon were passed through—1, cold slaked lime; 2, cold clay; 3, hot oxide of iron used at a gas-work in purification; 4, hot broken bricks; 5, hot broken glass—without, in any instance, producing sulphide of hydrogen. On the contrary, when passed through (1) hot lime and (2) hot clay, sulphide of hydrogen was formed and passed over immediatety, and continued to pass as long as the current was kept up. The lime, when cooled out of contact with the air, gave no sulphide of hydrogen upon being supersaturated will dilute sulphuric acid, but clay, when thus treated, gave off much.

The hydrogen used was in all cases passed through lime and over lead-paper, to secure its being free from sulphide before use. On one occasion, when the clay had been imperfectly dried before heating, I observed much sulphurous acid, instead of sulphide of hydrogen. I therefore passed hydrogen, bisulphide of carbon vapor, and steam over hot clay, which had been properly dried. At first, sulphide of hydrogen passed over alone, then mixed with sulphurous acid, which at length passed alone. Subsequently, sulphide of hydrogen passed, and at length sulphurous acid ceased. As the one gas increased, the other diminished, and throughout the experiment, sulphide of carbon vapor passed undecomposed. It is shown by this experiment, that hot clay, in the presence of more water than forms a hydrate, acts very differently from the same clay when dry, and the whole subject deserves a full investigation.

ACTION OF SULPHIDE OF HYDROGEN UPON CLAY AND LIME, COLD AND HOT.

Well-washed sulphide of hydrogen, passed into cold slaked lime (obtained from Buxton) in a tube, colors the lime green as soon as it comes into contact with it, and the progress of the gas along the tube corresponds with the coloration. Lead-paper is not affected until the lime becomes colored close up to the exit.

The same gas, passed into a tube containing slaked lime, kept at 600° Fahr. at the middle, but cool at both ends, acts differently. The cool lime at the inlet end becomes colored; the hot lime in the middle remains white; and the cool lime at the exit end becomes colored, and lead-paper is stained as soon as these two cool portions are saturated, while the middle portion remains unchanged in color.

The same gas, passed into a tube containing hot lime only, causes no discoloration, but instantly blackens lead-paper placed at the exit end; and, upon being conducted into a tube of cold lime, colors it as if it had just passed from the vessel in which it is produced.

The same gas was passed into a tube containing lime, which had been thoroughly dried at 600° Fahr., and cooled out of contact with the air. No discoloration of the lime took place, but the gas passed unaffected by the lime, and blackened lead-paper. Water added to the lime gives it the power of decomposing the gas as if it had not been heated. The presence of more water than is necessary to form hydrate of lime (Ca O, HO) is thus shown to be required for the decomposition of sulphide of hydrogen by slaked lime.

Sulphide of hydrogen passed into a tube of cold clay is taken up in considerable quantity, and the clay becomes black from the formation of sulphide of iron. The blackening begins at the inlet end, and progresses with the passage of the gas towards the exit end of the tube.

The same gas, passed into clay, heated to 500° or 600° Fahr., gives the same reactions; but when the clay has been heated and well dried, and cooled in the closed tube, it takes up a very small quantity of the gas.

Coal gas, quite free from sulphide of hydrogen, when passed through hot lime, blackens lead-paper, showing that masked and hitherto irremovable compounds have been so altered as to be easily removable. The lime does not take up sulphide of hydrogen, but becomes gradually, yet very slowly, darkened by the deposition of tar and carbon from vapor of bisulphide of carbon. The reaction with previously dried slaked lime commences at 108° Fahr., and continues through the whole range of temperature up to redness. At a red heat, the sulphur of the bisulphuret of carbon and other sulphur compounds unites with the lime and forms sulphide of calcium. Practically, very high temperatures are useless, as the hydrocarbons of gas begin to be decomposed about the melting point of lead, and to deposit their carbon upon the hot lime. Fortunately, injurious temperatures are not required. I have frequently freed gas from every trace of sulphur, so that upon combustion no sulphurous acid was generated, by employing lime so heated as not to deposit any carbon, and removing the sulphurretted hydrogen evolved in the hot tube by ordinary hydrate of lime.

The same gas, passed through hot clay gradually darkens the clay by forming sulphide of iron; and, when the blackness has reached the end of the tube containing the clay, lead-paper is blackened by the passing gas. The clay, treated with an acid, evolves sulphide of hydrogen. Carbonic acid is evolved in both cases. It is thus proved that bisulphide of carbon, in the presence of hydrogen passing over hot hydrate of lime, is decomposed, and that its sulphur becomes united to hydrogen. Coal gas always contains a considerable quantity of hydrogen, so that, if it contain vapor of bisulphide of carbon, the process I have the honor to describe will effect its removal. The same process will break up the impure naphthalin compound, and convert its sulphur into sulphide of hydrogen; and the employment of clay in the ordinary purifiers, before the gas passes through the hot ones, will so arrange the elements of certain other sulphur compounds as to enable the manufacturer to remove their sulphur as sulphide of hydrogen. Sulphocyanide of ammonium is decomposed by the heated lime, and its sulphur is liberated as sulphide of hydrogen. The only requisite for complete success was that no injury should be done to the light-giving materials of gas while removing the impurities. I have passed the principal illuminating constituents of coal gas through the hot lime and clay, and find that they are not injured. The temperature which suffices for purification is not high enough for injury. The photometer shows that coal gas is not injured.

The quantity of tar in gas as applied to consumers, and the evil of its presence as a source of sulphur, are not considered as, I think, they deserve to be. It is exceedingly rare to find gas free from tar, and I never yet met with tar which did not contain both nitrogen and sulphur. Part of this tar is combined with ammonia in some manner, and may be obtained by passing gas through a bottle containing pebbles moistened with hydrochloric acid. Part is united to naphthalin, as I have already mentioned; part is united to benzole vapor, and part to other hydrocarbon vapors, such as paraffin, if two instances within my own knowledge be sufficient to justify a statement in reference to gas in general. In one instance, I passed gas through a metal vessel filled with a number of wire-gauze diaphragms, and kept below 32° Fahr. Some cakes of solid paraffin were found floating upon the water which had been placed in the vessel before commencing the experiment, and a mixture of tarry oils which had deposited the paraffin. In another instance, an old gasholder was about to be replaced by a new one, and on the water of the tank in which the old gasholder had worked, there were found upwards of a thousand gallons of a dark-colored fluid. All but two carboys was sold to a tar distiller. These two carboys were left exposed to the air, without corks, for some time, and when the manager of the gas-work went to get some of the fluid for examination, he found that the whole contents had evaporated. I had previously, however, obtained about half an ounce of the mixture. It contained paraffin, naphthalin, and the oils which accompany paraffin. Nearly a fifth of its weight of solid pitch was obtained by distilling off the hydrocarbons. A quantity of sulphide of hydrogen and ammonia was evolved during the distillation, and some of the most stinking compounds I ever met with produced from coal. From these two instances, it is clear that some, or perhaps all, of the volatile hydrocarbons in gas possess the power of up holding tar with them in their vapors; and it is proved that this tar is no inconsiderable source of the sulphurous acid produced by the combustion of gas as at present purified. I have obtained tar containing sulphur from every specimen of commercial benzole I have examined; and, as this will evaporate at common temperatures without leaving a residue, we are justified in the presumption that tar thus united to benzole exists in gas.

The best method of showing the tar in gas is to pass it through or over well-purified coal oil, and subsequently through a good condensing arrangement. I have known colorless coal oil become of a dark mahogany color, and have separated sulphuretted hydrogen, ammonia, and solid pitch by distillation.

SEWER-AIR AND HOUSES.

ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

At a recent general meeting of the Metropolitan Association of the Medical Officers of Health the following discussion took place "on the best means to be adopted and enforced for preventing the entrance of sewer-air into houses, especially those inhabited by the upper classes."

Dr. Sanderson opened the debate. His remarks were founded on the following propositions:

"1. That among the many falsehoods and fallacies which are current among the public, and even professional persons, as to the causes of disease, there is no fact established on a firmer basis than that of the morbific agency of sewer-air, and that this agency is exerted more energetically by the small quantities which find their way furtively, but constantly, into houses, than by the large quantities which are disengaged by the gully-grates.

"2. That the state of our knowledge of the physical condition and movements of the air in sewers and house drains is very defective, but that it is certain that, on the present condition of the drainage in every drain that is not air-tight, a current sets, during at least nine months in the year, towards the house.

"3. That the fact is one of much greater sanitary importance than has hitherto been supposed; that it requires experimental investigation; and that, as from its seat it lies between the domain of the surveyor and that of the medical officer of health, it ought to be considered by them conjointly."

Dr. Sanderson supported those propositions by *a priori* reasoning, and by experimental observations and other facts. He exhibited an apparatus which he had contrived to gauge with the greatest accuracy the relative pressure of the air in the sewers and in houses, and the direction of currents of air in the sewers.

Mr. Chadwick agreed in the main with Dr. Sanderson, but believed that we should not be satisfied with our sewers being sewers of deposit, as for the most part they now are in London, but that they should be so perfect as to carry off all fœculent matters before there was time for decomposition to set in.

Dr. Gibbon and Dr. Chowne followed in the discussion.

Mr. R. Rawlinson believed that traps ought never to be relied on: he maintained that no drain or sewer should enter within the walls of any house. He said, that in many parts of London there were houses whose drains did not communicate with the sewer, although they were believed to do so, and there was a good sewer immediately in front of them. Carlisle was adduced as an instance of good sewerage. No man had entered the sewers to cleanse them since their establishment about six years ago, and Mr. Rawlinson stated that they were still in a clean state. Ventilating shafts were here used, and all the sewers were constructed on a uniform plan, and previously determined scheme.

Mr. Merry, surveyor of Paddington, then spoke, confirming Dr. Sanderson's experimental observations.

Mr. Thompson urged the great importance of the subject. He referred to the fact that sewer air did not usually contain sulphuretted hydrogen, but sulphide of ammonium, and was alkaline, favoring the growth of

animal life. The air of dwelling-rooms, on the contrary, was usually acid, and favorable to the growth of low forms of vegetable life. He spoke of all brick drains as means of allowing sewer gases to enter houses. He did not agree with with Mr. Rawlinson, but was favorable to *good* drains *under* houses, as they kept the basement dry. Dwellings in mews were always charged with sewage gases, unless better ventilated and drained than most of them are at present.

Dr. Lankester spoke of the low forms of fungi produced in air and water which were likely to be injurious to health. He alluded to the bad arrangements for drainage in many modern houses, as sometimes no traps are placed between the sewer and the house: sometimes pipes were put down without cementing the joints properly. He alluded to the experiment being made in the city of ventilating sewers and placing charcoal filters at the outlets of the ventilating shafts. He maintained that we should not rest contented until sewers acted so well as not to require special means of ventilation. He related the case of an eminent literary man whose death was clearly caused by sewer gas entering a house from want of proper traps.

Mr. Burge, Mr. Lord, and Dr. Aldis followed, and confirmed what Dr. Lankester had said as to the negligence of builders in draining many modern houses, as it appeared to be no one's business to see that the conditions of building contracts were complied with.

Mr. Druitt said that he was informed on good authority that paint became tarnished in London more readily now than a few years ago. Was this due to sulphur or carbon? Prabably the former. He alluded to the existance of many old sewers, whose presence was not marked on any maps, nor known until discovered accidently in excavations. He referred to the importance of spreading information on those topics in schools; also by sanitary tracts and lectures, referring especially with commendation to the labors of the "Ladies' Sanitary Association." He expressed a hope that the labors of the medical officers of health would be directed towards the getting of perfectly acting sewers, the emanations from which could not be noxious.

Mr. Lovegrove, surveyor of Hackney, made a few remarks, and exhibited his patent traps, constructed with a view of preventing sewer air entering houses at the time water is flowing down the house-drains. He called attention to the many practical difficulties attending the remodeling of the entire sewerage of a place drained as London is, on so many different independent plans, and with so many very defective old sewers.

Mr. Chadwick said a few words, and read some propositions embodying his views. They were, however, too comprehensive to be considered by the meeting at a late hour of the discussion.—*London Builder.*

REPORTS OF GAS-LIGHT COMPANIES.

RIO DE JANEIRO.

Messrs. Stockholders:

In pursuance of Article 10 of the By-Laws of the Company, I proceed to give you an account of the state of our undertaking, presenting to you the general balance-sheet up to December 31st, 1860, and have at the same time the pleasure of communicating to you the continuation of the prosperity which has always attended us.

The first semi-annual dividend was $21 50 per share, and that of the second $22, equivalent to 14½ per cent. per annum on the capital, besides my part of the earnings which the by-laws allow me, and which makes a net profit of 17 per cent. per annum.

During the last year, meters were placed in 640 private dwellings, and the public illumination increased by 209 lamps. This last part of the service which was imposed upon us, approaches its completion; although, within the limits to which the pipes extend, we continue to fulfil the orders transmitted to us by the Imperial Government.

The new and extensive gasometer operates with perfect regularity, giving full guaranty that it will be equal to any demand required for consumption, the progressive increase of which obliges us to enlarge considerably our retorts, which will be finished by next April.

In order to make more available the residue of the the production of gas, I caused a small manufactory for asphaltum to be erected by the side of the establishment, which I purpose to lease under conditions favorable to the Company.

The consumption of coke as a combustible applicable to kitchens, is in such favor that a strong demand has sprung up for amounts which we can furnish; so that I will advertise for proposals in order to make a contract with the highest bidder.

The Minister of Justice has lately abolished the ordinance for the examination of overseers for the laying of gas-pipes, which will tend to the better performance of said officers, although up to the present time we have not had to deplore any sad accident arising from explosions.

The officers of the Company continue to perform their duties satisfactorily.

In conclusion, I request you to appoint a committee for the examination of accounts, to whom the Directors of the Company will give all necessary explanations.

Baron de Maua.

Rio de Janeiro, March 1st, 1861.

Condition of the Rio de Janeiro Gas-Light Company, December 31st, 1860.

Assets.

Factory and other works, 1st contract	$1,426,706 74
Laying of pipes, 2d contract	732,081 69½
New tank	176,247 63
New works	94,224 87½
Slaves	56,000 00
Meters	143,251 18
Coal	70,000 00
Retorts	28,200 00
Carts and mules	8,100 00
Lighters	14,481 85
Factory of asphaltum	20,284 63
St. Peter's Theatre (meters)	7205 37
Lyric Theatre (ditto)	3,940 00
Cash	843 24
Sundry debtors (consumption and meters)	351,197 91
	$3,132,215 12

Liabilities.

Capital	$2,400,000 00
11th dividend	64 50
12th dividend	176,000 00
Reserve fund	179,639 80
Profit and loss	414 00
Baron de Mauá	32,000 00
Sundry creditors	344,096 82
	$3,132,215 12

Rio de Janeiro, January 2d, 1861.

Bartlett James.

Profit and Loss Account.

Dr.

Discounts and bills receivable, due and unpaid	$18,427 66
Interest (balance of that account)	32,443 41
Salaries and fees	44,590 00
Reserve funds	45,444 06
11th dividend	172,000 00
12th dividend	176.000 00
Half of the surplus from the 11th and 12th dividends belonging to Baron de Maua, in accordance with art. 18 of by-laws	60,000 00
Wear and tear of the lighters	2,000 00
Balance carried to year 1861	414 00
	$551,319 13

Cr.

Balance brought from year 1859	$61 89
Net earnings of the 1st six months from consumption of gas and meters	246,589 98
Ditto, ditto, from coke	27,241 59
Ditto, ditto, of the 2d six months, from consumption of gas and meters	246,718 47
Ditto, ditto, from coke	30,707 20
	$551,319 13

Rio de Janeiro, January 2d, 1861.

Bartlett James.

Water-Works of Liverpool, England.—The water committee of Liverpool, at a recent meeting, recommended that the water rates for 1861 should be as follows:

Supplies of Water by Meter.—When the consumption in any year shall not exceed 2,000,000 gallons, at the rate 1s. per 1,000 gallons. When the consumption in any year shall exceed 2,000,000, but shall not exceed 4,500,000 gallons, at the rate of 10½d. per 1,000 gallons. When the consumption in any year shall exceed 4,500,000 gallons, at the rate of 9d. per 1,000 gallons.

Supplies of Water for Horses and Cattle and for Washing Carriages, per annum.—Livery stables, per stall, 3s. 9d.; horses as mentioned in the Liverpool Corporation Water-Works Act, 1860, each 7s. 6d.; water for washing carriages other than private carriages as per act, each 10s.; water for washing private carts, vans, gigs, and like carriages, each 5s.; shandries and whitechapels not being kept by private gentlemen, 5s.; cattle, each 3s.

Offices.—15s. for the first room, and 10s. for every other room in the same occupation, with 6s. in addition in respect of each occupation for the use of the water-closets. Owners of stacks of offices paying in advance for the whole year in respect thereof will be allowed a discount of 15 per cent.

Shops.—Where no person resides on the premises, and where no extra consumption of water results from the trade carried on: For the first £100 of annual value, or a less sum, £4 per cent. per annum on such annual value. For the second £100 of annual value, or any part thereof, £3 per cent. per annum on such additional annual value beyond £100. For the third £100 of annual value, or any part thereof, £2 per cent. per annum on such nual value beyond £200. For the fourth £100 of annual value, or any additional amount of annual value, £1 per cent. per annum on such annual value beyond £300. Where an extra consumption of water results from the trade carried on, an extra charge will be made, to be determined by the committee according to the circumstances.

Shops.—Where any person resides on the premises, and where no extra consumption of water results from the trade carried on: For the first £100 of annual value, or a less sum, £6 per cent. per annum on such annual value. For the second £100 of annual value, or any part thereof, £5 per cent. per annum on such annual value beyond £100. For the third £100 of annual value, or any part thereof, £4 per cent. per annum on such annual value beyond £200. For the fourth £100 of annual value, or any part thereof, £3 per cent. per annum on such annual value beyond £300. For the fifth £100 of annual value, or any part thereof, £2 per cent. per annum on such annual value beyond £400. For the sixth £100 of annual value, or any part thereof, or any greater amount of annual value, £1 per cent. per annum on such annual value beyond £500. Provided that the charge for water to shops of this description shall in no case exceed £40 per annum. Where an extra consumption of water results from the trade carried on, an extra charge will be made, to be determined by the committee according to the circumstances.

Hotels, Inns, Public Houses and Beerhouses, and other Premises Licensed for the Sale of Spirits, Beer, or Wine by Retail.—Where no brewing is carried on the charge per cent. on the annual value of the premises fixed as the rate or rent for a supply of water for domestic purposes. Provided that the charge for water to premises of this description shall in no case exceed £40 per annum. If brewing be carried on, the premises will be supplied only by special agreement. Smithy hearths each per annum 10s. Water for manufacturing, or for any trade or business not enumerated, will be supplied by metre only. Water supplied to workshops or manufactories for drinking only by the persons employed therein:

	Per annum. s.	d.
Where the persons employed do not exceed 20	20	0
Exceeding 20 and not exceeding 40	40	0
Exceeding 40 and not exceeding 60	60	0
Exceeding 60 and not exceeding 80	80	0
Exceeding 80 and not exceeding 100	100	0
Exceeding 100, by special agreement, beyond 100s. ₱ annum.		

Schools.

	s.	d.	W. C. s.	d.
Not exceeding 150 scholars	10	6	5	0
Do. 300 do.	21	0	10	0
Do. 450 do.	31	0	15	0
Do. 600 do.	42	0	20	0
Do. 750 do.	52	6	25	6
Above 750 do.	63	0	30	0

Places of Worship.

Churches and Chapels, minimum	10	6	6	0
Do. do. maximum	21	0	6	0

or by special agreement.

Evansville, Ind.—A special meeting of the Stockholders of this Company was held at its office in this city, on Friday, the 26th April, 1861, for the purpose of filling vacancies in the Board of President and Directors, occasioned by the death of Clarence G. Keats, Esq., the late President, and the resignation, as Director, of Mr. Matthew Morgan, of New York.

Mr. John Jeffrey, of Cincinnati, representing over 1,000 shares of the Capital Stock of the Company owned in the cities of New York, Philadelphia, New Orleans, and Cincinnati, and several home shareholders, were present.

On motion, Dr. M. J. Bray was appointed Chairman of the meeting, and W. C. Browe, Secretary.

J. J. Chandler, Esq., the acting President of the company since the death of Mr. Keats, stated the ob-

ject of the meeting, and at his request Mr. Jeffrey expressed his views of the shareholders represented by him as to the policy which, in their opinion, should be pursued by the Board to be elected, urging especially the importance of the most rigid economy in order that they may receive some dividend upon their stock.

The resignation of Mr. Matthew Morgan was then read and accepted, and a ballot was had for two Directors to fill the vacancies occasioned by the same, and the death of Mr. Keats, which resulted in the unanimous election of Dr. M. J. Bray, and Mr. I. A. Crane.

The salaries of the President, Secretary, and Foreman were fixed, and thereupon the Board was organized by the election of J. J. Chandler President, and W. C. Browe Secretary. It was ordered that $100 be donated for the defense of the city, to be appropriated in such manner as the Mayor of the city and the President of the Company may determine.

After transacting the usual business, the Board adjourned.

Wm. C. Browe, Secretary.

A New Pump.—The *Southern Confederacy*, published at Atlanta, Ga., describes a Mr. Bellingrath's new pump as follows: We were shown this morning, by Albert Bellingrath, of this city, the inventor and manufacturer, a new style of pump, which, in our opinion, will soon supersede all others in use. It is not an *improvement* on any pump now in use, but something entirely new, and as far superior to any pump of which we have any knowledge, as it is new. It is *without valves*, and draws water or other liquids by the turning of a crank. Great difficulty has always been experienced in getting any pump that would lift oil, molasses, or hot water from vessels. Oil or molasses soon clogs up the valves, and hot water soon destroys them; and, in pumping water from wells, the valves often get out of order, and must be attended to. This trouble is entirely obviated with Mr. Bellingrath's new invention. It contains all the essential qualities of cheapness, simplicity and durability, and can be used for any purpose to which a pump can be applied. Mr. B. is a pumpmaker of this city, and has long enjoyed the reputation among us of being a faithful and superior mechanic. He obtained a patent for his new pump in January last, at Washington. The examiners in the Patent Office allowed his claim at once, testified that nothing equal to it, in the way of a pump, had ever come before them. This is a *Southern* invention and manufacture, and is in its line superior to anything that can be procured elsewhere. It will soon be brought before the notice of the public, to which we commend it—feeling well assured that nothing more than seeing it is necessary for its universal adoption.

Importance of Ventilation.—Passing from the private shop to public institutions, we are compelled to admit the same radical fault—the want of that element which is "the breath of life." In our churches, schools, and assemblies, people who go there suffer more or less from this evil. It is proverbial how persons, young and old, suffer from colds, bronchitis, and influenza; all of which are said to be "caught," when they return from some public place of assembly. The question naturally arises, how is this? The answer is, that it is caused by the sudden change which the body undergoes in passing from a heated impure air to that of the natural temperature, containing also its proper proportion of elements. Man requires for his health one gallon of air every minute of his life; the individuals of a church congregation are rarely, if ever, supplied with that quantity. Only at the cathedrals is the air space in proportion to the worshippers. A man of large lungs inhales about twenty-five cubic inches of air at each respiration; he breathes eleven times a minute, and thus requires nine and a-half cubic feet of air every hour. Now, when there are a thousand persons under one roof (some of the metropolitan churches and chapels contain 2,500 persons) for a couple of hours, it is evident that twenty thousand cubic feet of air are required to supply that which is necessary for existence to these thousand persons in a pure atmosphere, so that of course a much larger quantity than that is required in order that a current can be established to remove the effete matter of exhalation. The evils of vitiated air are also more to be guarded against, because persons can live in it without being aware of its danger as far as their sensations are concerned. When we enter a crowded assembly on a cold day the air is always at first repulsive and oppressive; but these sensations gradually disappear, and we then breathe freely, and are unconscious of the quality of the air. Science, however, reveals the fact that the system sinks in action to meet the conditions of the impure air, but it does so at the expense of having the vital functions gradually depressed, and when this is continued, disease follows. No disease can be thoroughly cured when there is a want of ventilation. It is related that ilness continued in a family until a pane of glass was accidentally broken, and then it ceased; the window not being repaired, a plentiful supply of fresh air was admitted. The practice of building sepulchral vaults under the churches was fraught with the greatest evil to the health of those who went into the edifice for sacred purposes. But, with few exceptions, it is now interdicted by the Legislature; still a great deal in the way of improvement has to be done. Nearly all the churches in the empire require some artificial means of ventilation to render them physically fit receptacles for the body during a prolonged service. The Sunday-schools also, as a general rule, are very ill-ventilated; and lessons in the second hour are far worse rendered than in the first, solely arising from a semi-lethargic coma that comes over the pupils breathing a carbonic air which has already done duty and been inhaled by others several times. However it is to be regretted, it is yet true that people will, at some times, sleep during the sermon. Now, the minister must not be twitted with this; for, with the oratory of a Jeremy Taylor or a Tillotson, people could not be kept awake in an atmosphere charged with carbonic acid gas, the emanations of a thousand listeners. The church-wardens should ventilate the churches, and see that the congregations have sufficient air for breathing. If the people go to sleep, they are more to blame than the preacher.—*Piesse's Laboratory of Chemical Wonders.*

The Lime Light in London.—The London Journals contain very favorable notices of the new lime light, produced according to an improved principle and arrangement of apparatus. The light is said to be of a pure white color and of dazzling brilliancy, making all the old gas burners in the proximity appear as dull as though they were burning in the bright sunlight of noonday, in comparison. This description of light is so intense that it can be distinctly seen at a distance of ninety-five miles. A single jet of the light, of medium size, is equivalent to forty argand, or eighty fish-tail gas burners, or to four hundred wax candles; and its intensity and brilliancy may be increased by augmenting the quantity of gas supplied. As compared with the illuminating power of common gas, a single jet, consuming four cubic feet of the mixed gases of hydrogen and oxygen, is said to be equal, in illuminating power, to that obtained from four hundred feet of ordinary gas. The mode in which the light is produced is by the combustion of lime under the great heat caused by the flame of the mixed gases. A stream of common gas, which is used instead of pure hydrogen, is conducted through one pipe, and a supply of oxygen is sent through a second one, each being attached to separate gas-holders. The pipes terminate near the lamp in one single tube, where the gases are allowed to mix in their way through a curved jet to what is called the wick of the lamp, which is simply a lump of lime, held in close proximity to the mouth of the curved tube by a piece of metal. In lighting the lamp, the first step is to direct the stream of hydrogen upon the lime; it is lighted, and gives forth a small flame of yellow color, soon succeeded by a flame of deep red. When the lime is in this state the oxygen is turned on, and instantly the bright white light is produced.—*Railway Review.*

Promotion of Dr. Antisell.—We are gratified to learn that the Commissioner of Patents has promoted Dr. Thomas Antisell to the position of chief examiner in the chemical department. The Commissioner could in no better way prove his own fitness for his office than by thus recognising the merits of one who has so long and so faithfully served in the department of which he is now the chief.

Things Ancient, Quaint and Rare.

ADVERTISEMENT

From the Providence Gazette, December, 1786.

JUST PUBLISHED,

And now selling by the printer hereof,

BICKERSTAFF'S

ALMANACK,

Or, Lady's & Gentleman's Diary,

For the Year of our Lord Christ,

1787,

Being the Third after Bissextile or Leap Year, and the Eleventh of American Independence.

Containing beſides the uſual aſtronomical calculations (which in point of accuracy are equal to any) ſome valuable Phyſical Receipts, a Method to make Flax ſoft and mellow, a Method to preſerve Turnips from the Fly, an Account of an extraordinary wild Man taken in a Foreſt of France, inſtructive ſentences of an oriental Philoſopher, the true Ambition of an honeſt mind, a Poem on Creation—Courts in the New England States, Friend's Yearly Meetings, a Table of Coins, a Table of Intereſt at Six per Cent., List of Roads, &c. &c. &c.

☞ The above Almanack may alſo be had in large or ſmall quantities of Jacob Richardson Eſq in Newport.

⁂ Great Allowance made to thoſe who purchaſe quantities.

ADVERTISEMENTS.

WHitehall, Sept. 12. His Majeſty in a religious ſenſe of God's heavy hand upon this Kingdom, in the late dreadful fire happened in the City of London, hath been pleaſed to order that the 10th of Octob. next be obſerved as a general and ſolemn Faſt throughout England and Wales, &c., and that the diſtreſſes of thoſe who have more particularly ſuffered in that calamity, be on that day moſt effectually recommended to the charity of all well-diſpoſed Chriſtians in the reſpective Churches and Chappels of this Kingdom, to be afterwards by the hands of the Lord Mayor of the City of London, diſtributed for the relief of ſuch as ſhall be found moſt to need it.

THe Grand Office for the Exciſe is now kept in Southampton-Fields, near the Houſe of the Right Honourable the Lord High Treasurer of England, and is every day open at the usual hours, for receiving and performing all things relating to that affair.

ALderman Backwell is at preſent placed in Doctor Gooddard's lodgings, in Gresham Colledge, where his affairs are managed as formerly in Lombard Street.

WE are deſired to Certifie, That the Affairs of the Custom-house are now Tranſacted in Mr. Jo. Bland's House, formerly known by the name of the Lord Baynings in Mark-lane, where the Farmers and Officers of His Majeſties Cuſtoms, with their Clerks and Attendants, will be ready on all occaſions at the uſual times, for the diſpatch of all Affairs belonging to them.

MR. Thomas Nevil, Comptroller of the Petty Cuſtoms in the Port of London, who formerly dwelt at the Crown in St. Paul's Churchyard, is now removed to the Ship between Temple Bar and Chancery Lane end over againſt the hither Temple-Gate.

THe General Letter-Office is now held in Bishopsgate-street, at Sir Samuel Bernardiston's Houſe, the ſame that Maſter Sheriff Hanſon ſometimes kept his Sheriffalty in.

MR. Thomas Warren who formerly lived in Baſing-lane near Bread-ſtreet, is now removed to Sir Thomas Bonfoyes house in Leadenhall-street, who is appointed as formerly to receive the Charity of well-diſpoſed perſons for the poor viſited people at Cambridge.

THE CALCIUM LIGHT AS A MEANS of WARFARE.—The government has made an arrangement to use the Calcium light at Fortress Monroe, and the apparatus has been set up on the parapets for a few days. This famous light possesses extraordinary illuminating power. One of the reflectors, which was once placed on the Latting Observatory in this city, cast a distinct shadow at Tarrytown, thirty miles distant. By the aid of this light, the garrison at Fortress Monroe are able to detect any vessels that may attempt to pass the fortress at night, and give its artillery a distinct object on which to be effective, no matter how great the surrounding darkness.

TURBINE WHEELS.—Our next number will contain an interesting account of the principal Turbine Wheels in use, together with illustrations of those most approved of.

PROPOSED WATER-WORKS AT CALCUTTA.—An effort is being made at Calcutta to procure the establishment of extensive water-works there. Without water-works the new drainage system will be productive of danger rather than advantage, as without means of flushing the sewers, they will collect vast quantities of pestilential gases. The water now supplied to Calcutta is pumped from the Hoogly river, at a point below where the sewerage of the town is allowed to enter.

DRAINAGE OF LONDON.—The total length of the sewers intended to be construced by the Metropolitan Board of Works in London, England, is nearly 74 miles. The length executed at present is not 19 miles, but above five more are in course of execution, and the total length contracted for is 46 miles.

GAS IN SCOTLAND.—The Glasgow, Scotland, Gas Companies will reduce the price of their gas 5d. per 1,000 cubic feet on the 1st of June.

STILL ANOTHER BREAK IN THE CROTON MAIN.—About nine o'clock on the morning of May 23d, a water-pipe burst in Worth street, near Church. The water came rushing out with great violence, tearing up the street, and filling a cellar which had been newly dug near by. The Croton Aqueduct Board was notified, and the water shut off. Workmen were employed promptly to repair the accident.

OUTBURSTS OF FIRE-DAMP.—"Blowers," or outbursts of fire-damp, occasionally burst out from the roof or walls of coal pits. A violent effusion of gas occurred some time ago at Kirkless Hall Colliery in England.

PETROLEUM SPRINGS IN ENGLAND.—The London *Engineer* says that petroleum springs exist in Derbyshire, also at Wellington and Coalbrookdale. There is petroleum also in the "Blue John Cavern," in the limestone, near Castleton, in Derbyshire.

COAL-OIL & CANDLES.

CANDLES FROM COAL.—Manufactured by the New York Paraffine Candle Co. Under Meuccei's Patent. The above Company having recently made great improvement in their mode of manufacture, now offer to the public a Candle superior to any other in the market. They give a softer and more brilliant light, and burn 6 hours to the pound longer than the best wax and sperm, and, considering the strength of the light, are the most economical Candles in use.

CAUTION.

As unscrupulous persons are already offering imitations of these Candles, purchasers should bear in mind, that every box sold by this Company is stamped with the annexed trade mark, to counterfeit which is felony.

For sale by all first-class grocers, and to the trade by WM. E. RIDER,
General Agent of the Company,
16 Beekman Street, New York.

STANDARD PHOTOMETRIC Candles.—Owing to a number of Applications made to me for information concerning the supply of the "Standard Sperm Canles," used in Photometrics, I have obtained a supply, from which I can furnish those who require them with full directions for use.

T. W. PARMELE,
No. 4 Irving Place, New York.

TO CANDLE AND SOAP Makers.—Processes with drawings to manufacture every kind of candles and soaps by different processes: Candles by distillation, saponification, French candles, common candles, hard and soft soaps, palm soaps; processes to bleach palm oil and make candles out of it; purification of tallow; essays on greases and soaps. Address, Professor H. DUSSAUCE, Chemist, New Lebanon, N. Y.

J. L. McREA, Dealer in Coal Oils and Lamps, Binnacle and Signal Light Oils, 139 Water street, New York.

THE LUTHER ATWOOD OIL CO.—Manufacturers of Superior Illuminating, Machinery and Binnacle Oils, Office, No. 34 Burling Slip, New York.

EMPIRE CITY CAMPHENE Works.—Aaron Seeley, Manufacturer and Distiller of Camphene, Alcohol, Burning fluid, Coal-oil, and dealer in Naval Stores of every description. 32 and 34 Burling Slip, New York.

H. RIDER & CO., New Bedford, Mass.—Purchasers and Manufacturers of Semi-Crude Paraffine. Ryder's Patent Paraffine Candles, manufactured and for sale.

NEW BEDFORD OIL CO.—Office foot of South-st., New Bedford, Manufacture Coal-Oil for Illuminating and Lubricating purposes, of the best quality.

ABRAHAM H. HOWLAND.

Our Coal-Oil will burn in all Kerosene Lamps.

C. R. WOODWORTH, Manufacturer of
PORTABLE GAS WORKS,
74 WALL STREET, NEW YORK CITY.

PORTABLE GAS-WORKS.

BUTLER'S PATENT PORTABLE
ROSIN GAS-WORKS,
FOR
Dwellings, Churches, Country Villages,
As well as for Consumers in Large Cities.
JOHN BUTLER,
No. 112 Fulton st. and 15 Henry st.,
Brooklyn, N. Y.

FOR LIGHTING RAILROAD CARS AND STEAMBOATS
☞ WITH GAS.
The whole process of Filling the Gas-Holders of a Railway Train, requires but Three Minutes.
Apply to the
NEW YORK CAR & STEAMBOAT GAS. CO.,
No. 117 Fulton st., N. Y.

PORTABLE GAS WORKS.—S. T. McDOUGALL'S PATENT Portable Gas Works, for making Gas from Rosin, Rosin Oil, Coal Oil, Naptha, Grease, etc. These Works combine the latest improvements in gas making, and are guaranteed to be superior to any in market. They are made of all sizes, suitable for either country or city use. No county house is complete without its Gas-Works. Gas Stoves of every description on hand and made to order. For sale by S. T. McDougall, 170 Center St., New York.

Agents wanted in other cities to sell rights or machines.

GAS FOR THE COUNTRY.—C. WOOSTER, Manufacturer of Improved Portable Gas-Machines, for Villages, Public Institutions, Churches, Hotels, Railroad Depots, Factories, Mills, Machine-Shops, Plantation Dwellings, &c. Office, 256 Canal street, near Broadway.

This Machine has been in successful operation for years, in many of the best residences and factories in the country; and for simplicity of construction, ease of management and economy of light produced, possess advantages over all other machines for the purpose now in use. It is adapted to the making of Gas from Crude Rosin or Rosin-Oil, producing a Gas of twice the illuminating power of Coal-Gas, at about one-half the price usually charged for that gas.

Every Machine is sold under a strict guarantee to operate according to representation, and no payment required until the fact is demonstrated by actual use.

For further particulars, and descriptive pamplet containing references to numerous parties now using the apparatus, address
C. WOOSTER,
No. 256 Canal st., near Broadway, N. Y.

For Engravings, see AMERICAN GAS-LIGHT JOURNAL, for June, 1860, page 245.

☞ Responsible Agents wanted, with whom liberal arrangemets will be made.

APPLETON'S IMPROVED GAS-WORKS, for Factories, Hotels, Dwellings and Towns. The most simple and economical works in use, furnishing a superior light to coal-gas at a cost of one-half a cent per burner per hour. It does not injure trees, or plate, and is not affected by cold. For Circular and Terms, apply to APPLETON & GRAHAM,
56 Washington street, Boston.

For Engravings, see AMERICAN GAS-LIGHT JOURNAL for April, 1860, page 213.

MARSH'S PATENT ROSIN OR Sun-Light Gas-Works, for Private Dwellings, Hotels, Factories, Railway stations, Sugar-houses, Towns, &c. By the peculiar construction of the Retorts, the largest amount of decomposing surface is obtained in the smallest space. 2d. Gas is manufactured from crude rosin, without the least deposit of carbonaceous matter in the retorts or pipes: thus enabling them to be operated continuously, generating rapidly the best and cheapest illuminating gas obtained from this material. ALFRED MARSH & CO.
241 Broadway, New York.

MARYLAND GAS COMPANY are constantly constructing their superior Patent
PORTABLE GAS-WORKS,
of any capacity, from that required for Private Dwellings, Public Buildings, &c., to such as will supply Cities and Towns, complete in all their parts, for the manufacture of Gas from either Rosin, Oil, Coal, or Rosin.

P. S.—This Company also manufacture a superior article of ROSIN-OIL, especially for Gas purposes. Their experience for the last nine years has secured for them a perfect success of their Gas-Works. Address
Maryland Gas Company, Baltimore, Md.

GAS AND WATER-PIPE.

W. & J. GRIFFITHS & CO.—City Tube Works, Malleable Iron and Brass Foundry, No. 27 North Seventh street, Philadelphia. Manufacturers of Wrought Iron Pipe, Lap-Welded Flues and Fittings; also, Brass Work of all descriptions, for Gas, Steam and Water. Particular attention given to Heating Buildings, &c.

PARIS'S PATENT
Glass-Enamelled Wrought Iron Tubes,
PROSSER'S PATENT
LAP-WELDED IRON BOILER TUBES.
TUBES FOR ARTESIAN WELLS, CONVEYING STEAM OR WATER, SHAFTING, &c., SCREWED OR COUPLED TOGETHER, in various ways.
THOS. PROSSER & SON, 28 Platt st., N.Y.

CAST AND WROUGHT IRON Pipe, Branches, Elbows, Sleeves, &c. Lamp-Posts, Wrought-Iron Lanterns for Lamp-Posts, Gas Retorts (clay or iron), Street Mains in 9 or 12 feet lengths. Sheet-Iron cut to pattern for Gas-holders. For sale by the Manufacturers' Agent,
HENRY G. NICHOLS, 24 Pine st., N. Y.

HUNTER, KELLER & CO., Manufacturers of
WROUGHT-IRON PIPES & FIXTURES,
of all descriptions, for
STEAM, WATER AND GAS.
144 Centre street, New York.

GIRARD TUBE WORKS—MURPHY & ALLISON, Proprietors. Wrought Iron Coke-Welded Tubes, for Gas, Water, Steam, &c. Wrought, Cast and Malleable Iron Fittings, Steam and Gas Cocks, Valves. Also, Galvanized Tubes and Fittings.
Office 1908 Market street, Philadelphia.

AMERICAN TUBE WORKS.—W. G. Smith & Co., Forty-sixth street, East of 10th Avenue, New York City. Manufacturers of WELDED IRON PIPE for Steam or Gas, of all sizes, from 1-8th to 3 inches.

JOSEPH NASON & CO., 61 BEEKMAN STREET, corner of Gold Street, New-York, Manufacturers of Wrought and Cast-Iron Pipes, and every description of Steam and Gas-Fittings used by Engineers, Manufacturers, and Gas-Fitters.

Boiler Flues,	Back Pressure Valves,
Steam Boilers,	Steam Traps,
Boiler Pumps,	Steam Whistles,
Steam Pumps,	Gauge Cocks,
Steam Gauges,	Gas Cocks,
Safety Valves,	Gas Meters,
Stop Valves,	Fitters' Tools,
Check Valves,	Proving Pumps,
Governor Valves,	Screwing Machines.

JOSEPH NASON,
HENRY R. WORTHINGTON.

MISCELLANEOUS.

[OFFICIAL.]

OFFICE WILLIAMSBURGH GAS-Light Company, Brooklyn, N. Y., May 16, 1861.—The annual election of seven Directors of this Company, and of three Inspectors of the next succeeding election, will be held at the Office of the Company, Fourth street, corner of South Third street, on Monday, the 3d day of June next. The polls will be opened at 5 o'clock P. M., and closed at 6 o'clock P. M. The Transfer Books will be closed from May 29th to June 3d, inclusive. By order
C. F. BLODGET, Secretary.

MESSRS. J. WRIGHT & CO., CONSULTING ENGINEERS and SOLICITORS of PATENTS, No. 42 Bridge street, Blackfriars, London, E. C. Patents for inventions obtained in all countries where Patent Laws are in force.

HOT WATER GAS STOVES, Manufactured by HUNTER, KELLER & Co., 144 Centre street, New York.
See Engravings on page 163, Vol. II. of this JOURNAL.

GAS-BURNERS.

T. G. ARNOLD, Manufacturer of Gas Burners, Mercury Cups, Portable Sockets, Burner Pillars, &c., No. 447 Broome street (second door west of Broadway), New York. Imported Scotch Tips and Burner Plyers always on hand.

ORNE'S PATENT FILTER-REGULATING GAS-BURNER, admitted by all practical and scientific men, who have examined its movements, to be
THE BEST GAS-BURNER YET INVENTED.
They are self-regulating, gas-purifying, indestructible, and most economical.
For sale by S. A. STETSON & CO.,
350 Washington st., Boston.

PERFECTION.—This recent Improvement in Gas-Burners embraces the great economy of the Hicks Patent Burner, a gain of over 75 per cent. in light. This Burner is now offered to the Trade and all consumers of gas, at the price of the common burner. It is anti-corrosive, gives a uniform and beautifully-shaped blaze, under any pressure, and will not get out of order.

It has been adopted by the Manhattan and Brooklyn, N. Y., Gas-Light Cos., for street lamps.

Samples will be sent to each Gas Co. in the United States, if requested.
Address, L. E. HICKS, 335 Broadway, New York.

HEATING APPARATUS.

JOSEPH NASON & CO., Constructors of Apparatus for Warming Public and Private Buildings by Steam and Hot Water.

Improved Fans for Ventilating Hospitals and other Public Buildings.
JOSEPH NASON,
HENRY R. WORTHINGTON,
No. 61 Beekman street, corner of Gold street, New York.

STEAM DOMESTICATED.—LOW Pressure Steam for Domestic Warming, an apparatus which is simple, durable, economical, and perfectly safe. Estimates given and work done in any part of the country.

Descriptive pamphlets furnished on application to BAKER, SMITH & CO.,
Sole manufacturers, Nos. 180 and 182
Centre street, N. Y.

GEORGE L. CANNON, Successor to the Rippowam Co., 54 East 13th street, between Broadway and University Place, manufacturer and dealer in Air, Water and Steam Warming and Ventilating Apparatus, Cooking Ranges, Range Furniture, Registers, Ventilators, &c.

Particular attention given to Heating Churches, School-Houses, Public Buildings, &c.

GASOMETER RIVETS.

PHILLIPS & ALLEN, Pennsylvania Avenue, above 22d street, Philadelphia.—GASOMETER RIVETS of all kinds.

GAS-METER FLUID.

FLUID FOR GAS-METERS.—The undersigned is prepared to furnish the Glycerine Meter Fluid in quantities to suit purchasers. *It does not evaporate, can be made to stand any degree of cold liable to occur in this country or in Canada, and does not corrode the metals of the meter. It has been in use successfully for the last three years.*

For particulars, references, &c., address the manufacturer, HENRY BOWER,
Box 868, Philadelphia, Pa.

WATER-METERS.

H. R. WORTHINGTON'S PATENT Water-Meter.—This Meter combines accuracy, simplicity and remarkable durability, with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our largest cities.

HENRY R. WORTHINGTON,
61 Beekman street, N. Y.

STOP-COCKS, &C.,

DANIEL THOMPSON, Machinist and Manufacturer of Stop-Cocks, Fire-Plugs, &c., for Water-Works, Stop-Cocks, Valves, Drip Pumps, &c. for Gas-Works, No. 133 Elfreth Alley, Philadelphia.

SCIENTIFIC BOOKS.

GAS ENGINEERS' LIBRARY.—A few works indispensable to Engineers, Contractors, and others engaged in the construction of Gas-Works and manufacture of Gas, have been selected, out of a large stock of chemical and other works, and are recommended to the attention of those interested. See page 208, vol. II, of this JOURNAL.

For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, New York.

COAL-OIL.—A PRACTICAL Treatise on Coal, Petroleum, and other distilled Oils, by Abraham Gesner. 8vo., illustrated. Cloth, $1.50.

Sent free by mail on receipt of the amount.
BAILLIERE BROTHERS, 440 Broadway, N. Y.

BAILLIERE BROTHERS keep always on hand a complete assortment of all new books on Chemistry and the Sciences.

Catalogues sent gratis on application.

PLUMBERS & GAS-FITTERS.

LOCKE & CRAIGIE, PLUMBERS and GAS-FITTERS, No. 12 East 20th street, New York.

LOCKE, CRAIGIE & CO., Gas-Fittings, Chandeliers, Brackets, Globes, &c., No. 927 Broadway, New York.

☞ Particular attention paid to country work.

JAMES HELME'S CHANDELIER AND Gas-Fitting Establishment, No. 58 East Thirteenth street, between Broadway and University Place, New York.

BRADBURY M. JOHNSON, GAS-FITTER and PLUMBER, No. 111 East Eighteenth street, New York.

A large and elegant assortment of CHANDELIERS, BRACKETS, &c. Gas-Pipe and Posts made for Gas Companies on favorable terms.

PATENT RIGHTS.

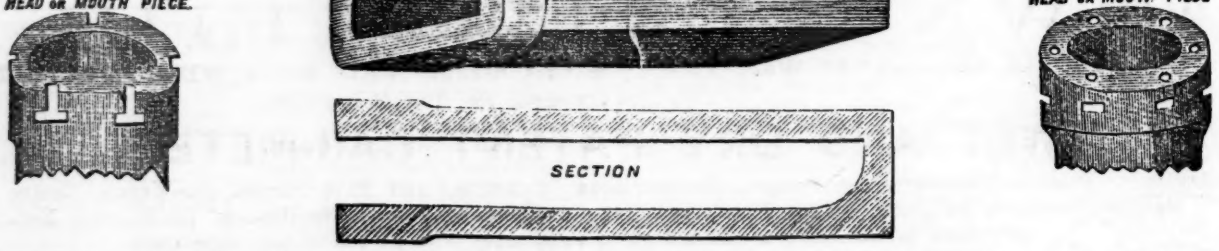
INVENTORS' DEPOT AND SALES Room for Patent rights.—Parties desirous of placing with us valuable Patents, for the sale of Rights, on commission, will here find the Head-Quarters for Inventors and their Patents, as well as for parties seeking investments in articles of undoubted merit. The public are invited to call, or send for circulars. New articles coming in daily. BUTLER, HOSFORD & CO.,
No. 30 Broadway, N. Y., Proprietors of the Paragon Self-Generating Gas-Light.

OLEOMETERS.

OLEOMETER, or HYDROMETER, For Kerosene, Coal Oils, Petroleum and other Distilled Oils. Scale by Dr. Gesner. Manufactured and sold by

G. TAGLIABUE, 298 Pearl st., New York.

KING BROTHERS,
STOURBRIDGE, ENGLAND, FIRE-BRICK AND RETORT WORKS.



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

Free from Cracks and Correct in Form.

By great care in Manufacturing, combined with the advantages in Burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

HARRIS & PEARSON,

PROPRIETORS OF

Best Glass-House Pot & Crucible Clay.

Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.

AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

CODE, HOPPER & GRATZ,

1500, 1502 and 1504 FILBERT ST., PHILADELPHIA.

MANUFACTURERS OF

Pressure Registers, Pressure Indicators, Pressure Gauges, Photometers, Governors, Station Meters, Customer Meters, (Wet and Dry,) Experimental Meters, (Wet and Dry,) Show Meters, (Wet and Dry,) Meter Provers, Centre Seals, &c.

The high reputation which we have enjoyed for more than twenty-two years, and the fact that we have manufactured a greater number of Gas-Meters than all other manufacturers in this country combined, must present itself as a security to parties desirous of securing the most reliable instruments. Having completed a most extensive addition to our Factory, and added many important improvements to our machinery, we are enabled to fill orders entrusted to us with despatch, and in all cases *guarantee entire satisfaction.* Our Patent Rotary-Valve Dry Gas-Meter is now used by upwards of Two Hundred Gas Companies, giving general satisfaction; we therefore recommend it, believing it superior to any other Dry Gas-Meter manufactured. All Meters tested separately by a sworn Meter-Inspector, and sealed when desired.

EDWARD COCKEY & SONS'
PATENT GAS-VALVES.

These Valves are formed of two Cast-Iron Cylinders, with segmental divisions, having the faces ground gas-tight—the upper cylinder turning horizontally on the lower one.

The lower Cylinder has pipes from each division, communicating with the vessels to and from which the gas is to be passed. The upper Cylinder has corresponding divisions, so arranged as to direct the passage of gas to the different segmental divisions in the lower part, and when it is turned on the face of the lower one, to alter the flow of gas from one vessel to another.

Each valve has an index-plate provided, which is to be attached to the floor, and a pointer on the cover of the Valve shows which way it is turned. Thus, the Manager of the Works can at once see in which direction the gas is passing.

There are about fifty of these Valves now in use, of sizes varying from two to twelve inches, and they are giving great satisfaction. Amongst the Works at which they are fixed, the following may be mentioned:—

BASINGSTOKE,	CHELTENHAM,	ENNISCORTHY,	FROME,	NEWPORT,	SANDWICH,
BLANDFORD	CANTERBURY,	ELGIN,	GODALMING,	RYDE,	WARMINSTER.

They are in course of erection at other important Works.

IRON WORKS, FROME SELWOOD, ENGLAND.

EDWARD COCKEY & SONS

ALSO MANUFACTURE

Purifiers, Scrubbers, Condensers, and other Improved Gas Apparatus,

HAVING PATTERNS SUITABLE FOR GAS-WORKS OF DIFFERENT SIZES.

MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS.

MANUFACTORIES

SUFFOLK ST. CLERKENWELL GREEN. & ALLEN ST. GOSWELL ST. LONDON.

BOSTON, Mass., 1 Barrett Street,—August 2, 1860.

RICHARD GLOVER begs to inform Gas Companies and Contractors that he has always on hand a large assortment of Thomas Glover's (of London) celebrated Dry Gas Meters.

Thomas Glover's Meters have now been in use in the United States and British Provinces, for the last Fourteen Years, and are extensively used by many Gas Companies, to their entire satisfaction; and R. Glover can with all confidence refer to them in proof that Thomas Glover's Meters are— the most Perfect in Principles— the most Correct in Registration—and more Durable than any other Dry Gas Meter made in the United States or Great Britain. R. Glover will at all times be glad to repair any Gas Meters sent him at the above factory. If any of them are of Thomas Glover's manufacture, and of a more recent date than Three years, he will make no charge.

DOWN & MERRIFIELD,

Nos. 340, 342, 344 and 346 West Twenty-second Street, North River, NEW YORK CITY,

MANUFACTURERS OF

WET AND DRY PATENT GAS-METERS,

Pressure-Registers, Pressure-Indicators and Gauges, Station, Show, Customer, and Experimental Gas-Meters, Centre or Hydraulic Valves, Governors, Compensators for Exhausters, and the Standard, Testing Gas-Holders* for Proving Meters, now used in the State of New York in compliance with an Act of the Legislature.

ALSO, BUNSEN'S PHOTOMETER, WITH COMPLETE APPARATUS FOR WORKING THE

* The standard of measurement of this Gas-Holder is given by Professors Torrey, of the U. S. Assay Office; Joy, of Columbia College; Gibbs, of the Free Academy, and several other distinguished scientific gentlemen.

JOHN J. GRIFFIN & CO.,

No. 7 BEEKMAN ST., and 76 WEST THIRTY-SEVENTH ST.,

NEW YORK CITY,

MANUFACTURERS OF WET AND DRY GAS-METERS,

Station-Meters, Proving-Machines, Show-Meters, Test-Meters, Pressure Indicators, &c.

All of our Work is Guaranteed to be of the First Quality, as well as the material, and for this we can refer to numerous Gas-Light Companies.

JOSEPH LENNIG & CO.,

Nos. 313 & 315 NEW MARKET St., above Vine St., Philadelphia, Pa.,

MANUFACTURERS OF

WET AND DRY

PATENT

GAS-METERS,

STATION,

SHOW, CUSTOMER,

AND

EXPERIMENTAL

METERS.

PHOTOMETERS,

PRESSURE-REGISTERS,

INDICATORS,

AND

GAUGES,

GOVERNORS, METER-PROVERS,

CENTRE-SEALS,

FLUID GAUGES, &c.

The flattering Testimonials we are receiving from Gas Officers, accompanied with expressions of such general satisfaction, and the fact of a tried experience for fourteen years, must present itself as a security to parties desirous of securing the most reliable Instruments. We therefore recommend our Patent Dry Gas-Meter, believing it superior to any Meter manufactured. Messrs. J. Lennig & Co. confine their sole attention to the business of Gas-Meter making.

Our materials are the best in use; the strictest attention is given to workmanship, and we guarantee entire satisfaction to all purchasers.

Purchasers may at any time inspect our Works, and the materials of which our Meters are manufactured. We are fully prepared to execute all orders, upon the shortest notice, and it will be to the interest of parties to call upon us.

☞ **Each Meter Tested Separately by a Sworn Inspector, and Sealed when desired.** ☜

METERS REPAIRED AND FORWARDED WITH DISPATCH.

GAS, STEAM, SMOKE,

PURE WATER & SOIL PIPE,

FROM

JOSEPH CLIFF,

Wortley Fire-Brick Works, Leeds, England.

T. W. PARMELE, Agt.,

No. 4 Irving Place, N. Y.

WARREN'S PATENT WATER & ALARM GAUGE,

For Protecting the Flues and Preventing Steam-Boiler Explosions.

This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low water Detector. For sale by

WARREN & BANKS,

153 Centre st., corner of Canal st., New York, Where a Gauge is constantly in operation.

JOHN RUSSELL & CO.,

PATENT TUBE MAKERS,

THE OLD TUBE WORKS, WEDNESBURY, AND THE ALMA WORKS, WALSAL, STAFFORDSHIRE,

69 UPPER THAMES ST., & 5 CHARLES ST., SOHO, LONDON;

AND 35 GRANBY ROW, MANCHESTER, ENGLAND.

The original Manufacturers of WROUGHT-IRON GAS TUBES, and the Inventors of the Lap-welded Tubes for Locomotive and Marine Boilers. All kinds of TUBES and FITTINGS, whether for Gas, Steam, or Water. Galvanized and Composition Tubes. Chandeliers, and every kind of Brass work for Gas and Steam.

STOCKS, DIES, AND TAPS OF ALL SIZES. CAST-IRON PIPE AND GAS-METERS.

All Goods Warranted.

THE

STERLING GAS-REGULATOR,

Improves the Light and Saves a Large Per Centage of Gas.

MANUFACTURED BY THE

WHEELER & WILSON SEWING MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New York Times, New York Herald, New York World, New York Tribune, New York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zietung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

WHEELER & WILSON SEWING-MACHINE CO.,

505 BROADWAY, NEW YORK,

To keep in order, and always maintain the pressurs of the Gas at the lowest point for a brilliant light and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

GENGEMBRE'S PATENT

NON-FREZING AND NON-EVAPORATING

GAS-METER FLUID.

By the use of this Fluid, the WET GAS-METER of ordinary sonstruction is rendered the most perfect and most reliable Gas Measuring Instrument ever offered to Gas Companies. In winter the Meter will continue to work equally well, *however exposed it may be;* and in summer the level of the Fluid remaining constant without refilling, the measurement of the Gas will be both uniform and constant.

The use of this Fluid is both easy and economical, and Gas Companies desirous of using it will be licensed on liberal terms. For further particulars, and certificates of parties having used the same for over three years, and for city rights, apply to

A. DOISY, Box 1180,

General Agent and Attorney for GENGEMBRE'S PATENT.

N. B.—No Sales of Territorial Right, or Licenses for using my Patent will be valid, without being ratified by my Signature, as I have no Agent authorizeed to execute the same.

H. P. GENGEMBRE, PATENTEE, Box 48, Alleghany City, Penn.

BURTIS' PATENT COMPENSATING COUNTERBALANCE FOR GASOMETERS.—This Improvement consists in making the attachment to the Gas-Holder by counterweights in such a manner as to effectually prevent it from getting out of level so as to bind, and also to prevent any escape of Gas at Cup or Hydraulic seal, where the Holder is on the Telescopic plan. Holders that work out of level are thus evenly balanced, and prevented from binding or lodging against Tank-wall and falling down, thereby being rendered unfit for service. Where Holders or sections of Holders cannot be used on account of the above difficulties, this arrangement will remove them, and place the Holders in good working order; moreover, with this attachment, deep tanks are not necessary.

BURTIS' COUNTERBALANCE has been in use for three years at the Gas-Works, Chicago, Ill. Its resistance to high winds and snow-drifts is alone sufficient to recommend its general adoption. For engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, p. 221. Address P. T. BURTIS,

Engineer Gas-Works, Chicago, Ill.

GAS THERMOMETERS FOR ascertaining and regulating the temperature of the gas while passing through the purifiers into the station meters. For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

UNION WIRE-WORKS.

ROBERT McMURRAY & CO., No. 29 Fulton Street, New York, Manufacturers of Copper, Brass, and Iron Wire Cloth for Gas Works, all kinds of Foundry Riddles, Sieves, and Screens. Improved Wire Window Shades, Wire Bolting Cloth, Duster-Wire, Wire Cloth for fanning machines, Rosin, &c., Locomotive Wire, Fire Guards, Ornamental Wire Work of every description. Patent Improved Wove and Laid made, repaired and designed to order.

McKINNY & KELLY,

MANUFACTURERS OF

COAL-SCOOPS AND COKE-BARROWS,

FURMAN ST., near Fulton Ferry, Brooklyn, N.Y.

F. BUTTS & CO.,

(Successors to BUTTS & KENDALL,)

DEALERS IN THE CELEBRATED

STERLING COAL,

PITTSBURGH AND OTHER GAS-COALS,

CLEVELAND, OHIO.

We beg to call the attention of Gas-Light Companies to the following, from which (and others), and the universal expression of Gas Men, as to the superior quality of

STERLING COAL,

we believe that it is THE BEST COAL IN THE COUNTRY.

From the Manhattan Gas-Light Co., N. Y.

Gentlemen—Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactorily—averaging 9520 cubic feet of 15 candle Gas per ton of 2240 lbs., and 41 bushels of Coke weighing 1465 lbs.

We consider it among the best of American Gas Coals, for the quantity and quality of the Gas produced, and also for the excellent quality of its Coke.

I am, Gentlemen, Your Obedient Servant,

CHARLES ROOME, *President.*

From the Rondout and Kingston, N. Y. Gas-Light Company.

Gentlemen—The 600 tons of Coal ordered from you in August, 1859, has now been in use over four months, to my entire satisfaction.

Its average yield is 4 40-100 feet, and a good strong light The Coke produced equal, both in quality and quantity, to best English Coking Coals. It burns very freely, with little clinker. In purification it is economical, using no more lime than New Pelton. It is superior to any American coal I ever used. I shall be pleased to give you any further information at my office in New York.

WM. W. HAGUE, 552 Broadway.

From the Sandusky, O. Gas Co.

Gentlemen—This Company has used your Sterling Coal since July 3d, 1856, and are still continuing the use of it with satisfaction to the Company and consumers. The average product has been 8,620 feet of Gas per ton of 2,000 lbs., and 37 bushels of Coke of very superior quality. The Gas is as good as that obtained from Pittsburgh coal. I consider it the best coal ever used in our works.

I am, Gentlemen, Yours Respectfully,

WILLIAM HUDSON, Sup't and Sec'y.

From the Toledo, O., Gas-Light Co.

Gents:—Your favor of the 18th inst. to hand and noted.

The Sterling Coal received from Messrs. Butts & Co., the last summer and fall, fully sustains the character it has as a Gas Coal, from previous use in our works. We think the quality of Gas is very good, a little better than that produced from the coal had of them the year previous—yielding 8,666 feet per ton of 2,000 lbs., and 36 bushels of Coke, of very good quality, well adapted to our use.

Respectfully Yours,

GEO. SPENCER, President.

From the Buffalo, N. Y., Gas-Light Co.

Messrs. F. BUTTS & Co.—The Sterling Coal we have had from you we find to be an excellent Gas Coal. The yield of both Gas and Coke is good. The illuminating power of the Gas is high and the quality of the Coke is very good.

ROBERT ROBSON, Foreman Gas-Works.

From the Cleveland, O., Gas-Light & Coke Co.

Gentlemen—This Company has used between 3,000 and 4,000 tons of your "Sterling Coal," and are still using it with satisfactory results. We find the average product of a ton of 2,000 lbs. is about 8,800 feet of Gas, and about 37 bushels of Coke. The Gas is of good illuminating power and quite free from sulphur or other impurities, one bushel of lime purifying 9,000 feet, and the Coke of very superior quality.

The yield of Gas is about the same as from the Pittsburgh Coal, and the Coke is better adapted to our use.

Yours truly,

T. DWIGHT EELLS, Secretary.

From the Albany, N. Y., Gas-Light Co.

Messrs. F. BUTTS & Co.—*Gentlemen*—We have been using your "Sterling Coal" at these works for two years, finding it all that is important in Gas-making Coal, as respects yield and quality of Gas, and freedom from Sulphur—as much so as any of the Coking Coal now in use. We are disposed to contract for a further supply of the same quality. Very Respectfully,

PAUL A. SABBATON, Sup't.

From the Troy, N. Y. Gas-Light Co.

Messrs. F. BUTTS & Co.—*Gentlemen*—The Coal we have used the past year at our works has been mostly "Sterling." It has given us full satisfaction in every respect. S. S. DAUCHY, Sup't.

The following analysis of Sterling Coal was made by Prof. J. LANG CASSELS, Professor in the Cleveland, O., Medical College, who stands at the head of his profession as a Chemist, and any statement made by him can be relied upon with safety.

Sp. gr.	1,288	
Hygremaeric Moisture,		1.85
Volatile Combustible Matters,		34.15
Coke, (clear and porous,)		64.00
		100.00
Fixed Carbon in the Coke,	62.00	
Ashes, (yellowish white,)	2.00	
	64.00	
COMPOSITION OF ASHES.		
Silex,		0.80
Al mini,		0.45
Sulphate of Iron,		0.75
		2.00
Per centage of Sulphur,		0.2

J. L. CASSELS, M. D.,

Prof. of Chemistry, Clev. Med. Col.

P. S.—The specimen from which the above analysis was made, was taken by myself from a car load, and may be regarded as a fair average; in fact this Coal is very uniform in its characteristics. It also yielded 4 per cent. more gas than the Pittsburgh Coal. J. L. C.

We would also refer to Gas-Light Companies in the following places:

NEW YORK CITY, (Manhattan and New York Cos.,) BROOKLYN, ALBANY, TROY, WEST TROY, ROCHESTER, OSWEGO, RONDOUT, KINGSTON, ALBION, BROCKPORT, SENECA FALLS, ELMIRA and LYONS, in the State of New York; CLEVELAND, TOLEDO, SANDUSKY, NORWALK and OBERLIN, in Ohio; DETROIT, ANN ARBOR, GRAND RAPIDS and KALAMAZOO, in Michigan; COBURG, in Canada; Chicago, Ill., and two Companies in MILWAUKIE, Wisconsin.

The extensive Mines in Pennsylvania, known as the Sterling Hills, (which are the highest in that part of the State,) are wholly under our control, and the coal is mined and sold only by us or our agents. As the coal has improved the further we have got in, and being several hundred yards further in than last season, with about a hundred feet more earth over it, *the quality of Coal we mine this year will be better than ever.* Some Coals are good in one or two particulars, and defective in others; but in combining all the qualities desired in a Gas-Coal, we know of none equal to the STERLING. Getting it to this place by Railroad, a supply can be had during the Summer months, (as well as at all other times,) which is not the case with coals dependent upon high water for transportation, as are those shipped from Erie, Pa. Having increased our mining facilities, we are prepared to ship on a more extensive scale than heretofore, and should be pleased to receive your orders.

☞ Having discovered that certain unprincipled Coal Dealers are endeavoring to sell an inferior article of Coal, under the name of STERLING, we deem it our duty, as well for your interest as for ours, to notify you, that you may be on your guard in purchasing what you might think was STERLING. *There is but one Sterling Coal Mine, and that Mine we have the full and entire control of;* and Gas-Light Companies can obtain the GENUINE STERLING COAL only by ordering direct from us, or F. WELLINGTON, Syracuse, N. Y., who is our only agent for that State.

F. BUTTS & CO.

CLEVELAND, O., March 1st, 1861.